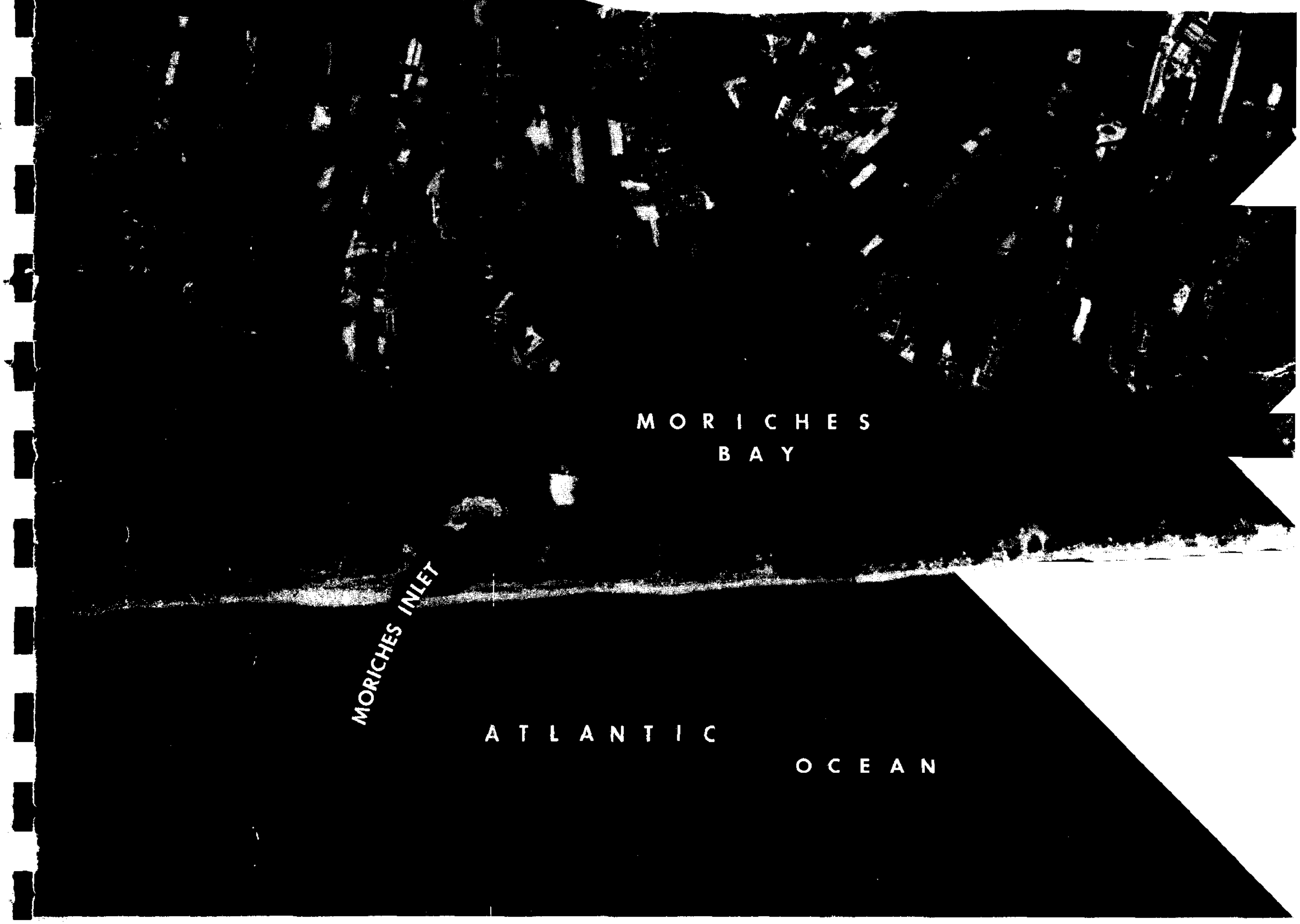
# OIL SPILL RESPONSE ACTIONS IN MORICHES INLET

## County of Suffolk, New York





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# SECTION I INTRODUCTION

## 1.1 STUDY OVERVIEW

The Long Island Regional Planning Board (LIRPB) with funds provided by the N.Y.S. Department of State under the Coastal Energy Impact Program, and with the assistance of the Regional Marine Resources Council and State and local governmental entities, initiated a three phase program in 1978 to develop options for the protection of all Long Island south shore bay environments from oil spills originating either from Atlantic Outer Continental Shelf (OCS) oil production activities or the tanker transport of petroleum products in the New York Bight. There are five shallow tidal inlets along the Island's south shore that link the bay environments with the Atlantic Ocean: Shinnecock, Moriches, Fire Island, Jones and East Rockaway Inlets. Under Phase I, the LIRPB prepared a report that contained recommended response actions for the containment and cleanup of oil spills impacting the Fire Island Inlet region (Long Island Regional Planning Board, 1979). Phase II, which was completed in 1981, recommended response actions for oil spills impacting Jones and Shinnecock Inlets (LIRPB, 1981a; 1981b). The subject report, Oil Spill Response Actions in Moriches Inlet, and a companion report for East Rockaway Inlet represent the final phase of this planning effort. All of the response plans prepared under this effort provide detailed site specific information for use by the U. S. Government On-Scene Coordinator in responding to significant oil spill events.

The program addresses the need as identified in the N.Y.S. Department of Environmental Conservation report, New York State and Outer Continental Shelf Development - An Assessment of Impacts, for the development of adequate oil spill cleanup capability. Oil spills - either from OCS activities or the tanker transport of petroleum - will continue to occur in the future in or near New York's coastal zone.* However, spills resulting from tanker transport activities in, and around, the south shore inlets pose crises requiring a rapid response if meaningful attempts are to be made to safeguard valuable marine resources found in shallow bays.** While little can be done to prevent the spill from impacting natural areas, certain response actions, as identified in this report can, to a limited degree, contain and collect oil before it fouls widespread portions of the productive habitats found in the barrier beach lagoons.

Oil spill contingency plans usually take the form of chain-of-command lists that identify responsibility for spill cleanup, and contain the addresses of potential contractors who have spill cleanup equipment. The state-of-the-art of such plans has been improved through the development of detailed, feasible oil spill cleanup strategies for the Moriches Inlet region. The strategies contain information on how and where available oil spill containment/

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*The worst oil spill in Long Island waters since authorities began keeping records of such incidents in 1972 occurred on 11 January 1978 when the tank barge Bouchard 100 spilled 210,000 gallons of heating oil into Long Island Sound waters near Eatons Neck.

**On 23 February 1981, the Coast Guard informed the LIRPB that a barge containing 2.7 million gallons of #6 oil was adrift in heavy seas eight miles south of Shinnecock Inlet. The barge broke from tow and there were no people aboard the vessel. The wind direction in the afternoon was from the southeast, and it was expected to shift to the southwest during the course of a storm predicted for the evening of 23 February. Coast Guard vessels were on the scene, and an attempt was being scheduled to reconnect the tow rope apparatus. Fortunately, the barge was reconnected during the early morning hours of 24 February and there was no spillage of oil. There are probably many events of this nature occurring that do not result in actual spills. However, the events continue to pose the potential of major oil spills along the south shore of Long Island that could seriously impact not only the ocean shoreline but bay shorelines as well.

cleanup equipment can be most effectively deployed in an initial response effort.

The potential oil spill problem and its relationship to the south shore bays has been documented in N.Y.S. Department of Environmental Conservation (1977), Long Island Regional Planning Board (1979), Hardy, Baylor, Moskowitz and Robbins (1975), and Stewart and Devanney (1974). These reports contain information on the susceptibility of Long Island's south shore to oil spills, as well as the environmental and economic consequences associated with such spills. Suffice it to say that an oil spill impacting the south shore bays could have a devastating effect on estuarine habitats that support extensive commercial and recreational fisheries and waterfowl populations. These bays are also used extensively for recreational boating and water-related recreational activities.

## 1.2 TECHNICAL CONSULTANTS

The conduct of this study required the services of consultants having expertise in:

1. oil spill containment and cleanup technology, and;
2. tidal data collection and hydrodynamic modeling.

Woodward-Clyde Consultants of San Francisco, CA and Tetra Tech, Inc., of Pasadena, CA and the Marine Science Research Center, Stony Brook, NY were retained by the LIRPB for these services. The process employed by the LIRPB in selecting consultants is reviewed in Long Island Regional Planning Board (1979) and other documentation prepared under Contract D142688 for the Fire Island Inlet spill response study.

## 1.3 REVIEW COMMENTS

Review comments on all phases of the work performed in the development of this spill control plan for Moriches Inlet were solicited by the staff. Meetings with local government personnel and the Regional Marine Resources

Council were utilized to monitor consultant performance and discuss the technical aspects of oil spill control. Appendix A contains a digest of comments raised by interested parties regarding the oil spill contingency plan presented here. This digest is an integral part of this report, as it contains information pertaining to the implementation of recommended strategies detailed in Section 5.

## 1.4 BACKGROUND INFORMATION

Part of this study was devoted to the preparation of inventory information on subjects germane to the cleanup and disposal of oily waste. Appendix B contains an inventory of oil spill equipment available in the Long Island region. This appendix is in four parts:

1. equipment owned by spill contractors and spill cooperatives;
2. equipment owned by Federal, State and local agencies;
3. equipment owned by members of the Long Island Oil Terminal Association (LIOTA) under cooperative cleanup agreement; and
4. equipment owned by private companies.

Appendix C consists of an up-to-date listing of facilities that are capable of processing oily waste, as well as a listing of approved waste oil collectors located in the New York Metropolitan Region. Preparation of this appendix was necessary because of the problems associated with finding a location for the disposal of oil-contaminated materials resulting from spill cleanup.

Information on dispersants, their application techniques and environmental effects is contained in Appendix D. Appendix E deals with sorbent barrier construction for use at the entrances to mosquito ditches and other low current areas.

## SECTION 2 OIL SPILL SCENARIO

The primary objective of this study is the development of recommended initial response actions to prevent or minimize oil pollution in the Suffolk County south shore bay system that might result from oil spills impacting the Moriches Inlet region. In order to develop initial response plans it was necessary for the LIRPB staff to define an oil spill scenario that would reflect various factors influencing the selection of response actions. The scenario described below represents a "worst case" situation; it is based on the characteristics of petroleum transport activities in the New York Metropolitan Region.

### 2.1 OFFSHORE SPILL SCENARIO

The Port of New York and New Jersey is one of the major ports of the world. In 1975 ship arrivals at the Port were estimated at over 10,000 vessels. Seventy-one percent of the total waterborne commerce - 127 million short tons - consisted of shipments of petroleum products and crude oil to terminals in the Port of New York and New Jersey for refining. Even if pipelines are used to transport crude oil that may be produced from Atlantic Outer Continental Shelf areas, "there is still a substantial danger of spills from tankers that presently travel nearly parallel to Long Island" in the Nantucket/Ambrose traffic lanes south of Long Island (N.Y.S. Department of Environmental Conservation, 1977, p. 67).

Approximately one-third of the 2,400 trips of all tankers between the 20,000 and 70,000 DWT range entering the Port in a given year travel the Nantucket/Ambrose traffic lanes. Tanker traffic in these lanes could increase up to 19% (150 additional trips), if all the potential oil produced from the Georges Bank were tankered to the Port and foreign oil imports were not displaced. The additional tanker traffic would increase the risk of oil spills. Tankers up to 85,000 DWT utilize the Nantucket/Ambrose lanes to transport oil to the Port of New York and New Jersey. However, vessels of this size and others in excess of 40,000 DWT must lighten their cargo at sea.

The following scenario developed by the staff for the preparation of a spill response plan at Moriches Inlet reflects petroleum transport activities in the northern section of the New York Bight.

> *The loss of an 85,000 DWT tanker carrying crude oil approximately 23 miles south of Moriches Inlet at the location, 40°26'18"N, 72°45'12"W, during summer weather conditions that are conducive to the northerly transport of spilled oil. A probable cause of the casualty would be collision with another vessel.*

The spill site is located in the separation zone between the Nantucket/ Ambrose traffic lanes. The oil spill technology consultant was instructed to amplify this scenario through the provision of sufficient detail that would be required in the formulation of spill control strategies.

## 2.2 LIKELIHOOD OF SPILL EVENT AS DESCRIBED IN THE SCENARIO

The oil spill event described above is based on characteristics of petroleum transport in the New York Bight. While both small and large spills associated with tanker casualties are not uncommon events when viewed on a global scale, it is not possible to make accurate predictions of spill events, and the probabilities associated with them on local time and space scales. In general terms, smaller spills are more probable than larger spills, but again, quantification of the likelihood of such spills was not attempted in this report. Such a computation would also be complicated by adding dimensions of spill location and timing, both of which would act to decrease the likelihood of the scenario event.

What can be said is that the specific spill event as described in the scenario is highly unlikely. For the purposes of oil spill planning, it was necessary to relate response actions to an event whose occurrence is possible in the region, and has the potential of causing a major environmental disruption.

## SECTION 3 CONCLUSIONS AND RECOMMENDATIONS

Rapid currents in Moriches Inlet would make booming there only partially effective, and oil would therefore spread into Moriches Bay. The use of all the locally available self-propelled skimmers, except for the LPI of Moran-Crowley, to clean up oil in Moriches Bay is not feasible because of the abundance of shallow waters and rapidly changing shoals. To help compensate for this absence of all but one of the self-propelled skimmers, boats towing booms in "U" configurations could be used to herd oil to be picked up by small skimmers.

Due to these rapid inlet currents and the absence of all but one self-propelled skimmer, oil entering Moriches Bay will deposit on some shorelines, mainly at the north end of the bay. The implementation of predetermined response actions (deploying booms, oil herding, small skimmer use, LPI skimmer use) should be effective in limiting shoreline contamination and damage to the area's environmental and economic resources. The strategic deployment of booms is especially important in limiting this contamination. Since the spill is located far offshore and 60 hours are required for the oil slick to reach Moriches Inlet, adequate time is available to deploy booms prior to its arrival.

Upon request of the U. S. Government On-Scene Coordinator, Clean Harbors Cooperative and local spill contractors such as Marine Pollution Control would be able to supply all the boom, small skimmers, boats, and related equipment necessary to execute spill response actions.

The construction of permanent anchor points at all shoreline boom termination points could help to reduce response times, in addition to providing the necessary stable anchoring points required for booms under increased tensile forces (i.e., diversion booms). A concrete block buried below ground with a protruding eye bolt would serve as an adequate boom anchoring point. These blocks can be cube shaped (2 ft x 2 ft x 2 ft) or longer (4 ft x 4 in x 4 in), with the long dimension buried perpendicularly to the directional force.

Under the conditions presented in this scenario, the use of chemical dispersants to treat the oil slick in offshore waters would be necessary in limiting the amounts of oil washing onto the barrier island beaches and through Moriches Inlet into Moriches Bay. This is especially important during the warmer, summer months when visitor usage of the beaches is at a maximum. Also, limiting the amount of oil in Moriches Bay is important because the use of self-propelled skimmers there is not feasible due to shallow waters and shoals and rapidly changing bottom conditions.

Dispersants limit slick spreading by causing oil to mix vertically into the water column. However, some of this dispersed oil may still be carried ashore by subsurface currents, although these subsurface currents are slower than surface currents because they are relatively uninfluenced by winds. This dispersed oil would tend to move in a westerly direction along the shore, but some would most likely be carried to the Moriches Inlet area.

Since 24 to 36 hours are required to implement a dispersant spraying system, an immediate decision would have to be made if they are to be used. Under these scenario parameters, an aerial dispersant spraying system would be most effective.

To limit contamination of the barrier island beaches and to aid in cleanup, the construction of a sand berm at the beaches mid-tide line is recommended.

This report should be forwarded to the office of the U. S. Coast Guard Captain of the Port, New York, for their consideration. Portions of this report should be incorporated into the Oil Spill Contingency Plan which covers the area under the Captain of the Port's jurisdiction, of which Moriches Inlet is a part.

## SECTION 4 HYDROGRAPHIC CONDITIONS AT MORICHES INLET

In order to conduct an assessment of the environmental factors which would effect oil spill response actions, it was necessary to review and analyze the available hydrographic data for Moriches Inlet. The results of this review are found in Tetra Tech Inc. (1981a).

### 4.1 HYDROGRAPHIC SETTING

Moriches Inlet connects the Atlantic Ocean with Moriches Bay, a shallow bar-built estuary on the south shore of Long Island (Figure 1). Moriches Bay, in turn, is hydraulically connected on the west to Great South Bay through Narrow Bay, and on the east to Shinnecock Bay through the Quogue Canal. Depths within Moriches Bay vary from one to 11 feet with an average mean-low-water depth of about four feet. Isolated holes with depths of over 20 feet are known to exist. The bay's total surface area is about 15 square miles between Potunk Point and Smith Point, and the tidal prism is approximately 850 million cubic feet of water which passes through Moriches Inlet on an average tide. Water exchange with Great South Bay and Shinnecock Bay are minor compared to the direct exchange with the Atlantic Ocean through the inlet. The above generalization of Moriches Inlet and Bay applies only during certain periods for reasons discussed below.

Over the years, from 1931 to present, Moriches Inlet has undergone many physical changes which include closing of the inlet before 1931,opening between 1931 and 1938, gradual closing again in 1951, construction of jetties between 1951 and 1953, reopening artifically in 1953 and planned periodic heavy dredging since 1953. The physical changes are due to the erosion and deposition of sand and sediment at the inlet in addition to the strong hydraulic effects induced by the Shinnecock Inlet. In turn, Shinnecock Inlet is affected by conditions at Moriches Inlet.

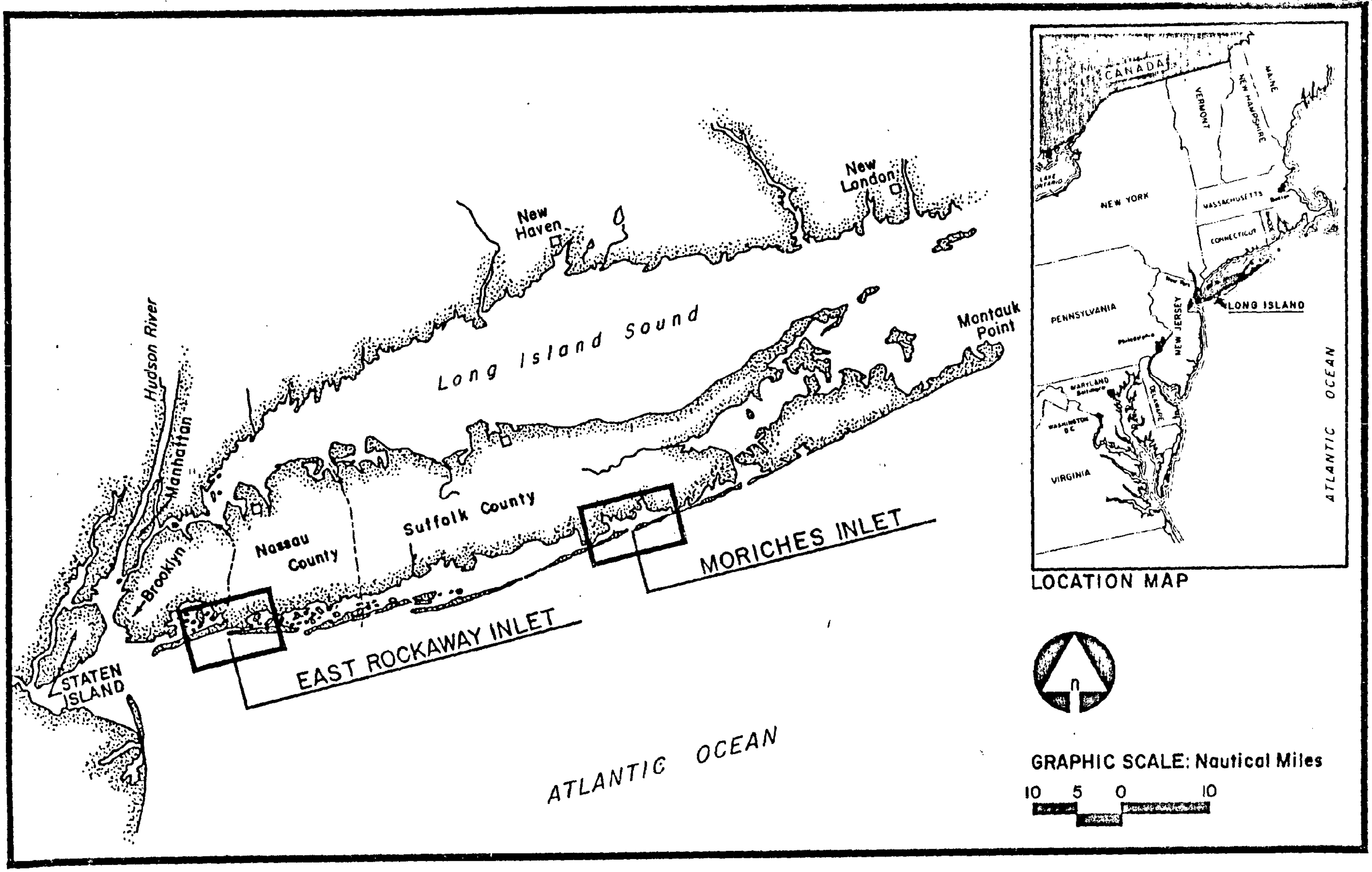


FIGURE 1: LOCATION OF EAST ROCKAWAY AND MORICHES INLET STUDY AREAS

## 4.2 HYDROGRAPHIC CHARACTERISTICS OF MORICHES INLET

The following paragraphs summarize available data on littoral forces that affect Moriches Inlet -- tides, currents, winds, waves, storms, ice conditions. However, these data again are only applicable for periods when Moriches Inlet is open, for example, from 1953 to present.

Tides dominate the circulation and mixing of water within Moriches Bay. The tides within the study area are semi-diurnal, with a period of 12.42 hours. The mean tidal range in the Atlantic Ocean south of Moriches Inlet is about 2.9 feet, with a Spring range of 3.5 feet, and a Neap range of 2.1 feet. Aside from the ocean inlet, tidal flow within Moriches Bay is influenced by the connecting waterways with adjacent bays. Tidal exchange occurs between Moriches Bay and Shinnecock Bay via the Quantuck and Quogue canals and between Moriches Bay and Great South Bay through Narrow Bay. The tidal exchange occurs because the times of high and low water are different on opposite ends of the connecting waterways. According to Redfield (1952) the tide reaches Smith Point from Moriches Inlet about 40 minutes ahead of the tide moving easterly through Great South Bay from Fire Island Inlet, thus west Moriches Bay water flows into eastern Great South Bay on flood tide. In addition, there is a net westward flow through Narrow Bay over each tidal cycle. Similarly, there is a net westward tidal flow through the Quantuck and Quogue canals from Shinnecock Bay into Moriches Bay.

Recently, Moriches Inlet has experienced a major breach through the adjacent barrier beach and efforts are currently being made to control the size of this breach. The potential effects of these natural and man-made activities on hydraulic interaction between the two bays are presently not known.

The maximum observed ocean storm tide within Moriches Bay was 15.7 feet above mean sea level during the hurricane of 21 September, 1938 (USACE, 1959). However, this high elevation possibly includes the wave run-up. Storm tide data were taken inside the bay but not at the inlet.

The currents in Moriches Inlet and interior channels are primarily controlled by tidal action. Thus current velocities vary with the tidal stages and reverse in direction about every 6.2 hours.

Tetra Tech, Inc. (1981b) conducted a numerical study of circulation and dispersion for Great South Bay and contiguous regions. The model output of maximum velocities in Moriches Inlet were 1.9 knots on both ebb and flood tides. These values represent average tidal conditions.

The report, Computed Current Velocities in Moriches Inlet and Moriches Bay (Pritchard and DiLorenzo, 1981) presents computer simulations of current velocities and directions in Moriches Inlet and Bay under varying tidal and meteorological conditions. A two-dimensional, finite-element, transient state hydrodynamic model was used. Figures 2 and 3 illustrate relative current velocities and directions under conditions of a typical storm surge coincident with spring tide; and calm winds during neap tide, respectively. It was noted that the shape of the inlet induces a crowding effect during ebb tide which contributes to shoreline erosion.

Along the south shore of Long Island, the prevailing winds are from the southwest (USACE, 1965). On a seasonal basis, the prevailing winds are from the southwest from April through October, from the west in November and December, and from the northwest in January, February, and March. At sea, the winds from the westerly quadrants prevail. Velocities approaching 100 miles per hour have been reported along the South Shore during storms. Storm wave

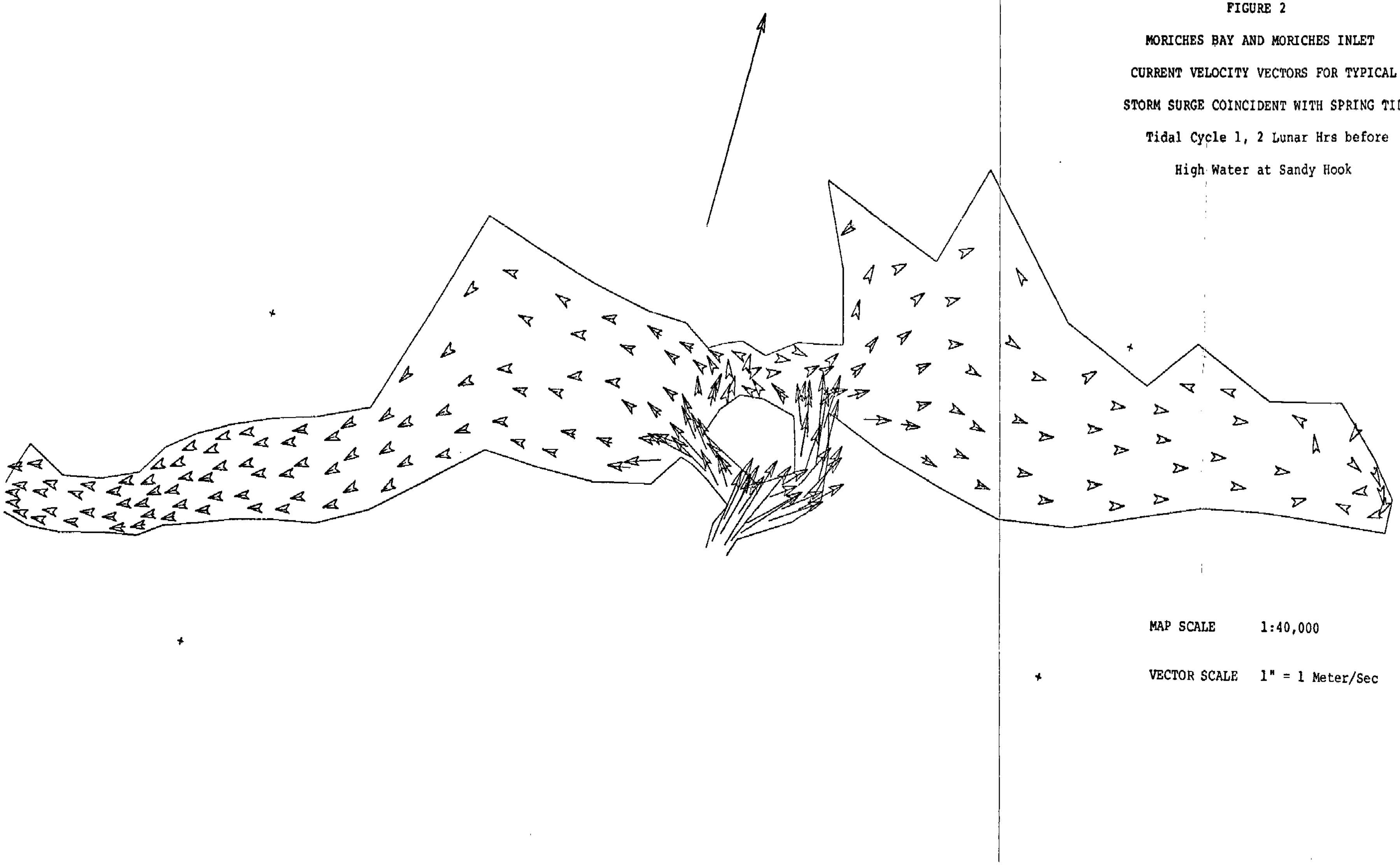


FIGURE 2

MORICHES BAY AND MORICHES INLET

CURRENT VELOCITY VECTORS FOR TYPICAL

STORM SURGE COINCIDENT WITH SPRING TIDE

Tidal Cycle 1, 2 Lunar Hrs before

High Water at Sandy Hook

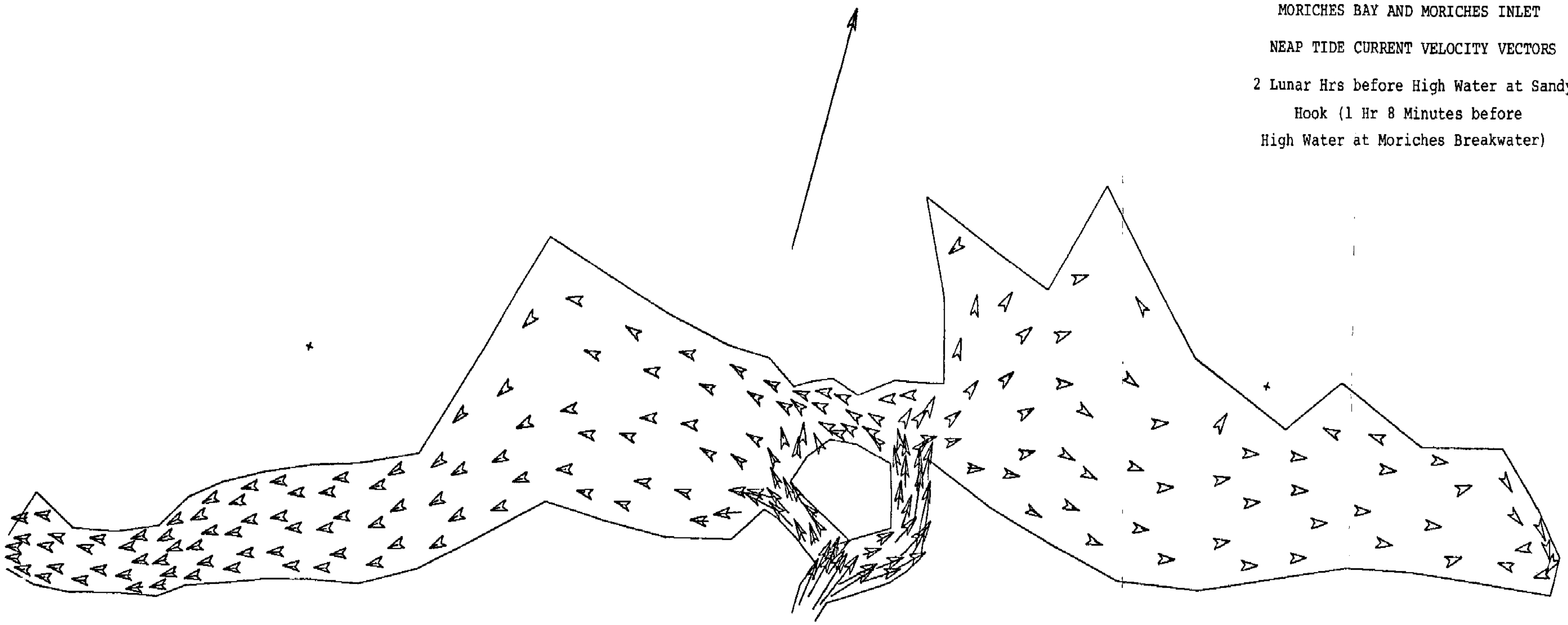

FIGURE 3

MORICHES BAY AND MORICHES INLET

NEAP TIDE CURRENT VELOCITY VECTORS

2 Lunar Hrs before High Water at Sandy Hook (1 Hr 8 Minutes before High Water at Moriches Breakwater)

MAP SCALE 1:40,000

VECTOR SCALE 1" = 1 Meter/Sec

heights of 20 feet have been reported off the south shore of Long Island and wave gauges operating off Gilgo and Jones Beaches have recorded a maximum height of 13.4 feet. Visual surf observations were made from the Short Beach Lifeboat Station at the western end of Jones Beach for the period of October 1954 to December 1957 which show that 98 percent of the waves were from the southern quadrant and the remaining 2 percent were from the east. The waves from the southeast and southwest predominated, with 41 percent and 40 percent of all the waves coming from these directions, respectively. During the period of observation, only 5 percent of the waves had a height of 4 feet or greater.

Water temperatures in the Atlantic Ocean south of Fire Island Inlet range from -2°C to 10°C in January and 17°C to 26°C in August (Lettau et al., 1976). There are no known problems due to ice conditions along the ocean frontage in the study area (USACE, 1965). Moriches Bay will freeze over in shallow water areas and in the open bay; however, the channels leading into the inlet and the inlet itself will stay relatively free of ice.

## SECTION 5 RECOMMENDED OIL SPILL RESPONSE ACTIONS

### 5.1 INTRODUCTION

The Moriches Inlet region of Long Island supports a multiplicity of uses. Great South, Cupsogue, and Westhampton Beaches on the barrier island are popular vacationing spots visited by great numbers of people each summer. The marsh areas of Moriches Bay, although not as extensive as in other portions of the South Shore Bay System, provide prime habitat for ducks, terns, deer, etc. A variety of fish, including striped bass, bluefish, and flatfish are caught near Moriches Inlet for both commercial and recreational purposes. Soft and hard clams are harvested commercially throughout Moriches Bay. Commercial and recreational marinas line the Bay shoreline, as does private residential property.

Oil impacting the barrier island beaches or entering Moriches Bay through Moriches Inlet, could have deleterious effects on all the aforementioned resources. However, through the efficient use of spill containment and clean-up actions these detrimental effects could be minimized or averted. The feasibility and effectiveness of these spill response actions can be predicted by examining a hypothetical scenario that closely approximates a potential spill incident. By looking at such incident-specific factors as type of oil spilled and quantity, slick movement and evaporation, currents and tides, prevailing winds and weather conditions, and response time available, the degree to which these response actions can be implemented is predicted with sufficient accuracy for planning purposes.

### 5.2 DETAILS OF OIL SPILL SCENARIO

The scenario put forth in this study represents the most probable major oil spill that would occur at Moriches Inlet; a spill 23 miles offshore in the shipping lane resulting from a tanker accident.

The spill scenario was evaluated using the following procedure:

1) Slick Modeling. The general trajectory and spread of the spill was predicted for the scenario conditions. Key data desired from this effort included first arrival time, rate of subsequent movement, probable extent of water and shoreline contamination, and the net movement of the slick within the inlet.

2) Priority Analysis. This analysis considered the resources of the immediate area and their biological, aesthetic, recreational, and economic values. These resources were assigned protection priorities according to both their sensitivities to spilled oil and their values.

3) Local/Regional Response. Local and regional oil spill response resources were inventoried and their probable response times evaluated. Response time evaluations are based on an initial reaction and mobilization period, estimated travel time to the response site, and estimated deployment time as a function of equipment type. Response feasibility, effectiveness, and generalized impacts were also considered.

4) Equipment Performance. Most spill control equipment only functions effectively within a certain range of environmental conditions. This evaluation considered limiting characteristics of the inlet and vicinity, limiting scenario criteria, and performance characteristics of locally and regionally available equipment.

5) Scenario Assessment. The preceding factors were assessed for response feasibility, effectiveness and generalized impacts.

### 5.2.1 Scenario Parameters

This scenario considers a major crude oil spill associated with an 85,000 DWT tanker casualty. The accident occurs in the shipping lane approximately 23 miles south of Moriches Inlet, at 72° 45'12"W, 40° 26' 18" N. A probable cause of the casualty would be collision with another vessel. Other spill scenario parameters include the following:

Spill Size. Loss of two adjacent cargo tanks is assumed, approximate volume of 107,000 bbls (16,000 tons), total release within minutes.

Oil Characteristics. Oil density of 0.854 gm/cm$^3$ (34° API Gravity), pour point of -15°F, viscosity of 43 sus at 100°F.

Season. Summer.

Tide. Slick encounters Moriches Inlet at maximum flood tide.

Wind. From south at 10 knots.

Waves. Calm conditions, waves less than 1 foot in Moriches Bay.

Temperature. 80°F.

#### 5.2.2 Spill Movement

The map shown in Figure 4 represents the Offshore Oil Spill Trajectory Time Series Model for the tanker accident described for this scenario. As the slick moves northward, it spreads out, reaching a diameter of 4.68 miles after 60 hours, when it impacts the shore of Long Island.

The model incorporates slick movement and spreading (Premack and Brown 1973), diffusion (Okubo 1971), and evaporation (Mackay, et al. 1980). Southerly winds at 10 knots were used to drive the slick north toward Moriches Inlet. The slick moves at a speed of 0.3 knot, or roughly 3 percent of the wind speed. No non-wind induced currents are used in the calculations because the existing currents do not generally move perpendicular to the coast and consequently would not decrease the slick's travel time to Moriches Inlet. Longshore drift off the coast of Long Island is to the west. If the modeling took into account this longshore drift, the spill site would have to be located farther to the east to compensate for the westward drift. Under these conditions, speed of slick movement and distance to shore would both increase, most likely augmenting the slick's travel time to Moriches Inlet.

The spilled light crude oil would be subject to considerable evapora-

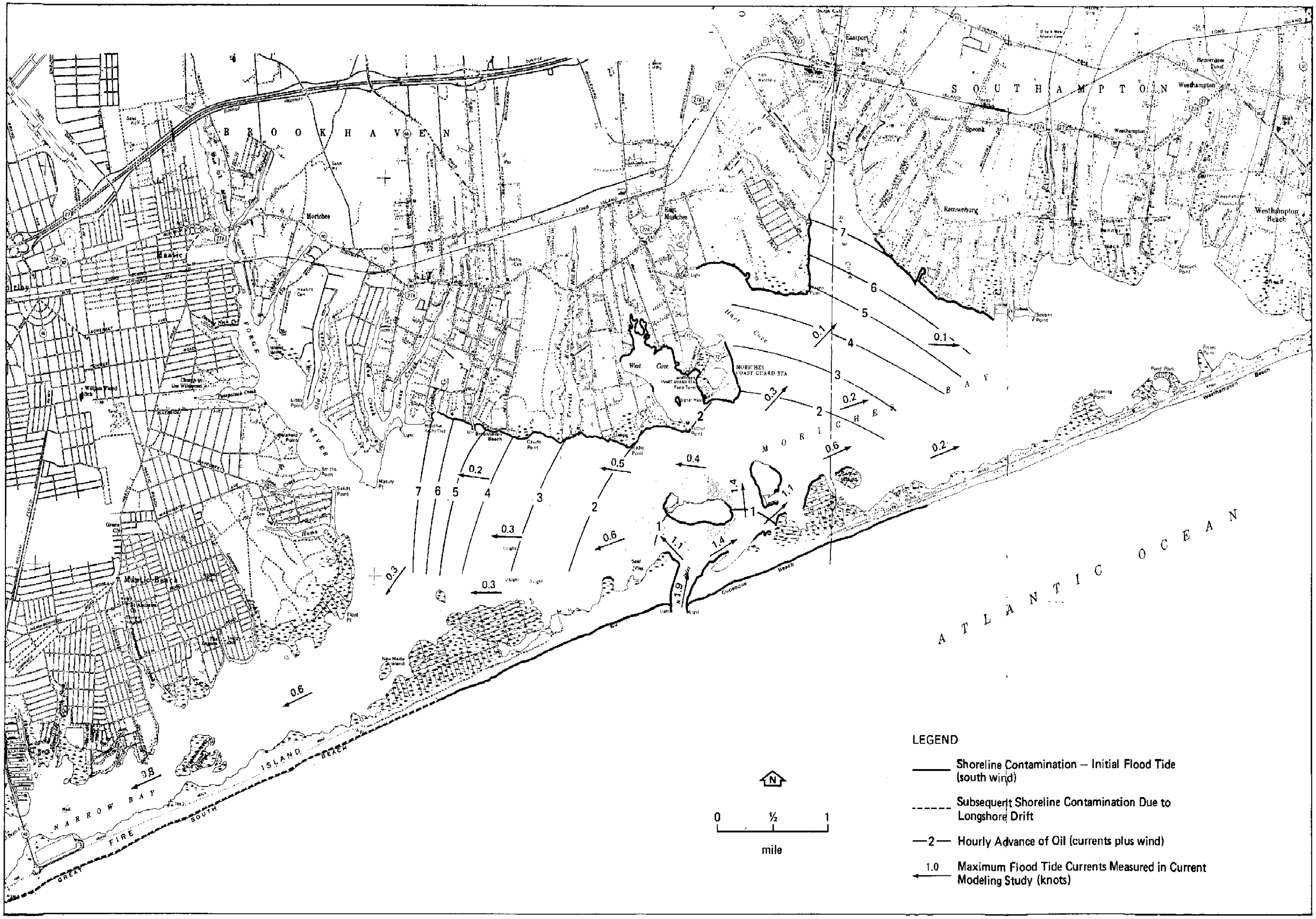


Figure 5. SHORELINE CONTAMINATION WITHOUT RESPONSE ACTION IMPLEMENTATION

be contaminated initially by the slick. Once inside the Inlet slow currents and southerly winds would tend to drive the slick away from the north shore of the barrier island and toward the north shore of Moriches Bay. During the initial flood tide, the slick would be carried west to Areskonk Creek and east into Seatuck Cove. Approximately 13 miles of bay shoreline would be contaminated by the slick if response actions are not taken; the majority of which consists of private and commercial property. Marsh contamination would be minimal.

## 5.3 PRIORITY ANALYSIS

An oil spill as presented in this scenario would adversely affect the natural, recreational, commercial, and residential resources of the Moriches Inlet/Bay region. In the event of such a spill, certain of these resources should receive priority in oil spill protection and cleanup due to their environmental or economic sensitivity to the effects of spilled oil.

Great South, Cupsogue, and Westhampton Beaches are popular vacationing spots used by great numbers of visitors during the warmer summer months. Oil on the beach or in the near shore zone could drastically diminish visitor usage of these beaches, decreasing the tourist trade which constitutes a major portion of the local economic base. Therefore, these beaches should receive priority consideration in protection and cleanup. During the colder winter months when visitor usage is minimal, these beaches are less economically sensitive to the effects of spilled oil, and priority could shift to some of the more vulnerable (both economically and environmentally) areas.

All marshland in Moriches Bay should receive priority consideration also, and every effort should be made to exclude oil from these areas. Not only are these marshlands susceptible to the toxic and smothering effects of spilled oil, but oil also tends to persist for longer periods of time in these areas. In addition, marshlands are prime habitat for a variety of wildlife species (certain of which are used as commercial catches). Some of the prime wildlife areas include:

- Western Moriches Bay, Seatuck Cove - Wintering Diving Ducks
- Pond Point - Wintering waterfowl
- Moriches Inlet - Striped Bass, Bluefish, Flatfish, Mussels, Harbor Seals
- Moriches Bay - Hard Clams
- Remsenburg Shoreline - Soft Clams
- Cupsogue Beach - Surf Clams
- Moriches Inlet Island - Tern nesting and feeding grounds
- Great South Beach - Right Whale and Porpoise sightings

The marinas and other commercial-recreational areas which line Moriches Bay should receive priority consideration, as should residential shoreline, even though both types of area are not usually as environmentally sensitive as the wildlife habitat.

## 5.4 SPILL RESPONSE ACTIONS

Response to an oil spill typically includes attempts to contain the spilled oil, to exclude it from environmentally sensitive areas, and to remove it. When considering overall impact, response actions that limit the area of oil contamination are most significant. For the scenario in question, feasible protection response actions to the predicted movement of the spilled oil were considered. These actions were developed by setting priorities for sensitive areas that might be impacted by spilled oil. Type and amount of oil spill equipment available in the New York area, prevailing environmental conditions (water depth, current velocities, access, areas of natural oil accumulation, air and water temperatures), and spill response time were all considered in determining the feasibility of the responses.

Oil spill response actions are difficult to execute in Moriches Inlet and Bay for two reasons: the predominance of shallow water and sheals, and the rapid currents in the vicinity of the inlet. Figures 6, 7, and 8 show the areas within Moriches Bay with water depths less than 2, 4, and 6 feet (mean low water), respectively. However, these water depths change so often that the U. S. Coast Guard recommends that boats with drafts greater than 3 feet stay out of Moriches Bay. Even the Long Island Intercoastal Waterway, which is dredged to six feet, changes so rapidly as to make it unsafe for boats that require more than three feet of water. Since all self-propelled skimmers available in the New York City area have at least a four foot operational depth (JBF 3001-4 ft, JBF 3003, Marco Class ID, and Bennett Mark GE-6 ft) they can not be used for oil spill cleanup in Moriches Bay. An LCI skimmer with a three-foot draft could be used. Deploying booms in water less than 2 feet deep is not recommended because a certain amount of free water space between the bottom of the boom skirt and the Bay's bottom is necessary for effective booming. It should be noted that although both small pleasure craft and fishing boats regularly pass through Moriches Inlet, the Coast Guard warns against boat traffic in the Inlet due to rapidly changing shoal conditions.

Maximum calculated flood tide currents for selected locations within Moriches Inlet and Bay are shown in Figure 5. Although the fast currents of up to two knots at the Inlet would make booming difficult and less effec-

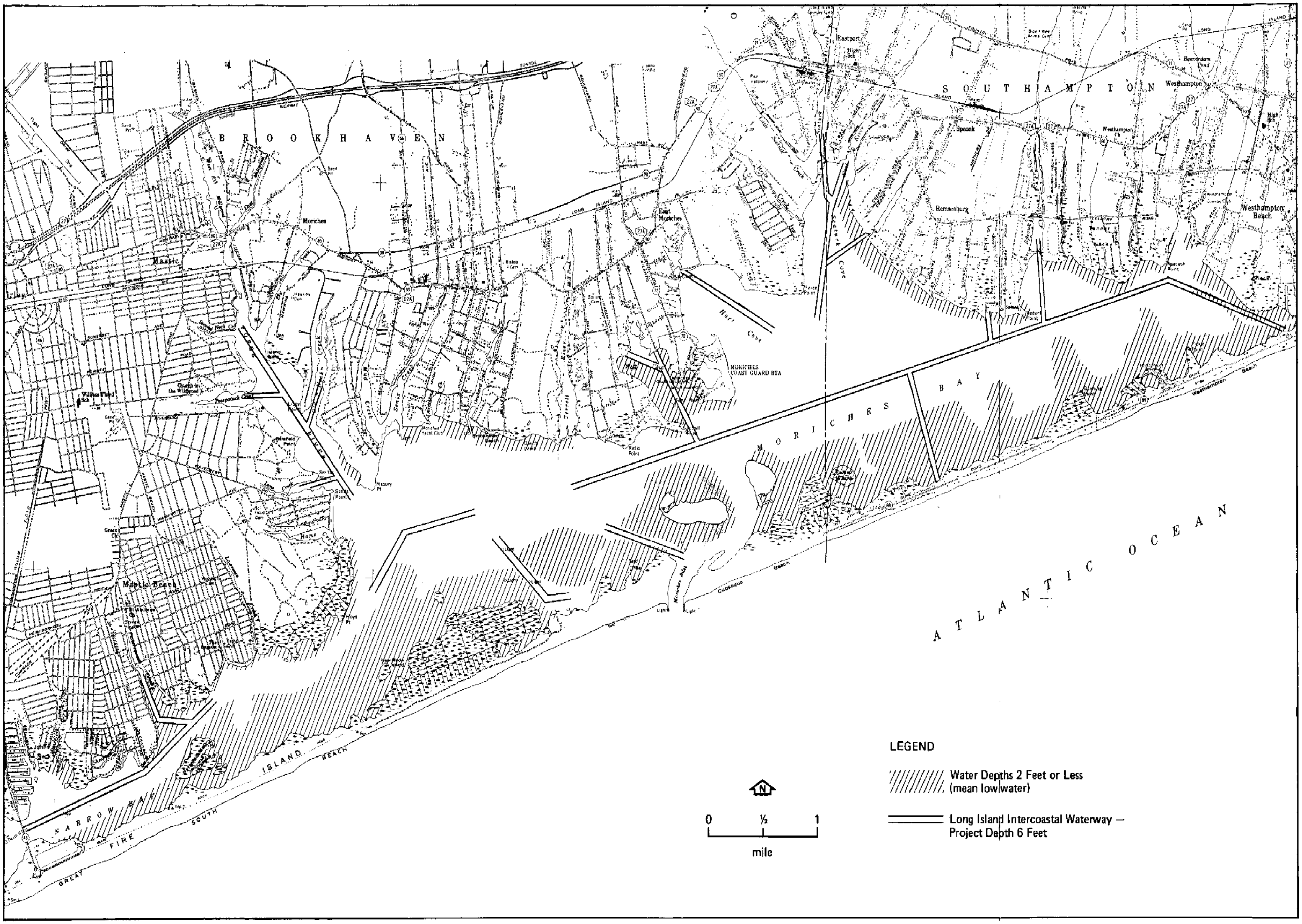


Figure 6. WATER DEPTHS 2 FEET OR LESS (mean low water)

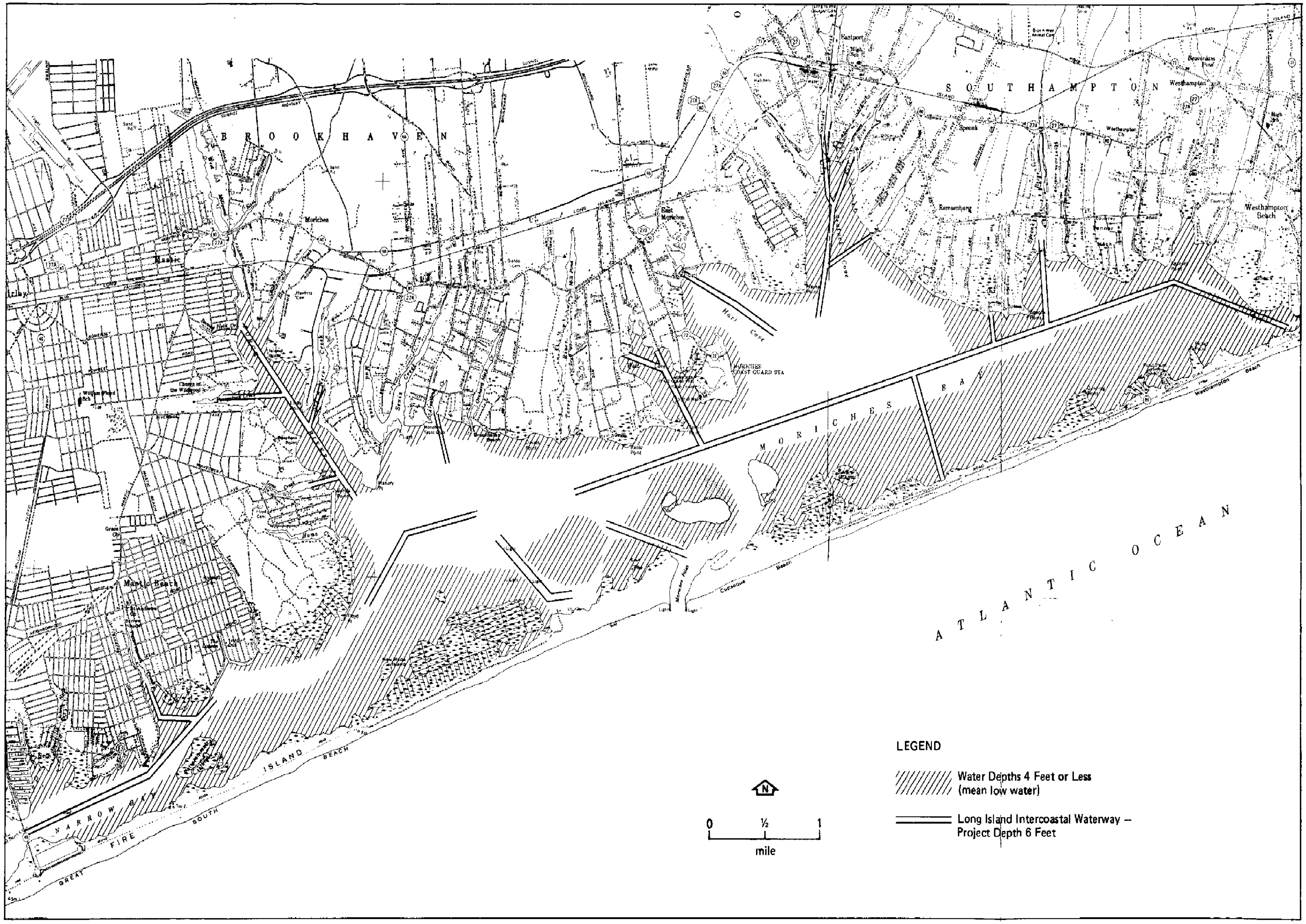


Figure 7. WATER DEPTHS 4 FEET OR LESS (mean low water)

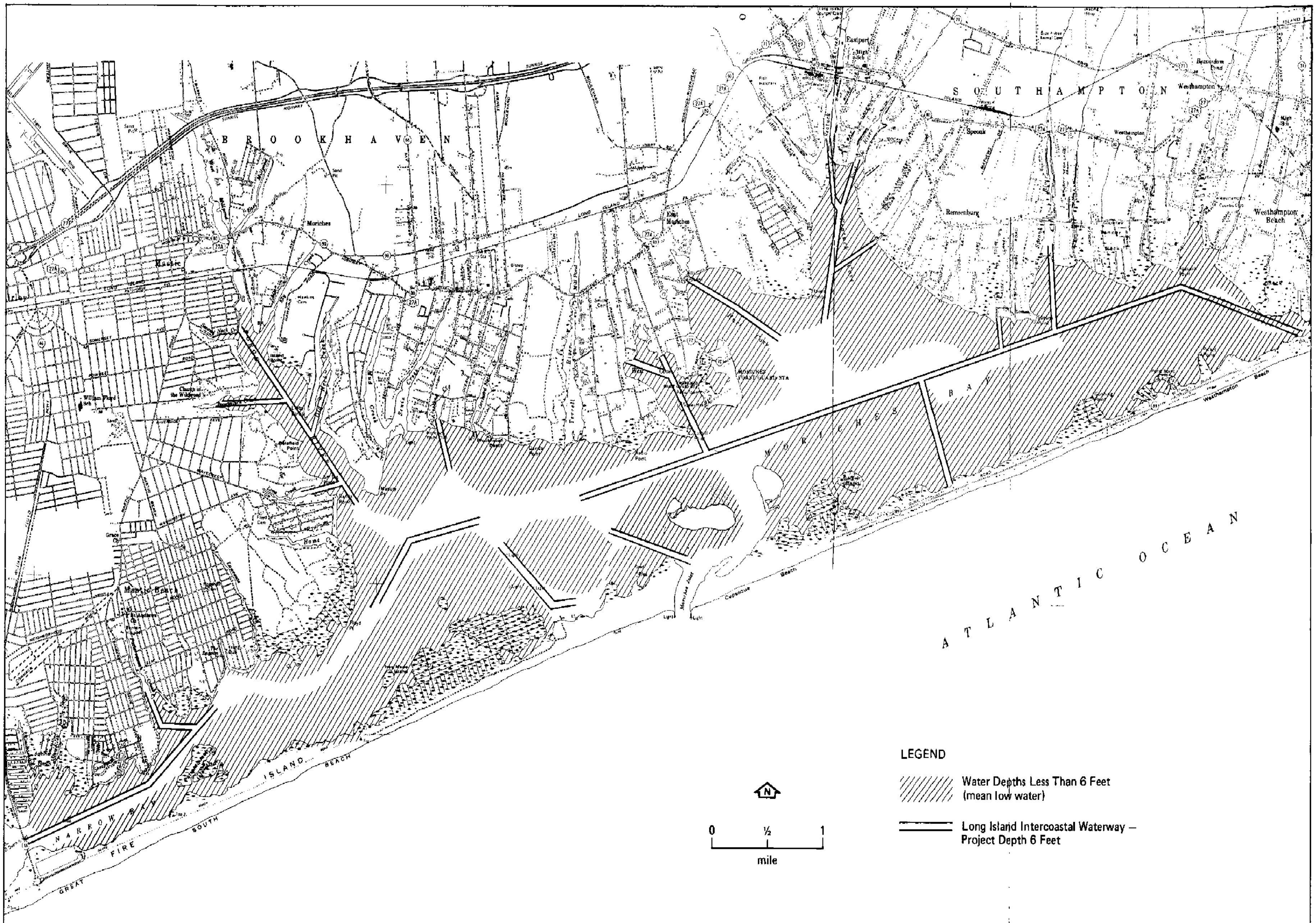


Figure 8. WATER DEPTHS LESS THAN 6 FEET (mean low water)

tive there (N. Vanderkooy et al. 1976), current velocities drop quite rapidly once inside Moriches Bay, where most of the measured current velocities are less than 0.5.

Since approximately 60 hours would be required for the oil slick to travel the 23 miles from the accident site to Moriches Inlet (with up to seven additional hours for slick movement inside Moriches Bay), adequate time would exist in which to mobilize an effective spill response effort. Due to the rapid currents right at the Inlet, the slick could not be effectively contained there using booms. The slick would have to be contained in the quieter waters inside Moriches Inlet where currents are less than one knot.

Since the incoming tide and southerly winds would tend to drive the oil toward the northern shore of Moriches Bay, diversion booms placed on this shore at points of natural oil accumulation along with exclusion booms deployed at creek, marsh, and marina entrances would limit the extent of contamination and also protect these sensitive areas. Small skimmers with vacuum trucks would be used in conjunction with all diversion booms and the exclusion boom at Cupsogue Beach to clean up contained oil. Figure 9 shows the locations of booming sites and points where small skimmers and vacuum trucks would be used to recover oil. Table 1 lists spill response actions for the Moriches Inlet area.

The staging area for the spill response effort would be Seatuck Cove Marina. This marina is well suited for this purpose because it has a boat ramp, boat lift, is in deep enough water to launch spill response boats, and has adequate adjacent open space to accommodate spill response vehicles and equipment. With 60 hours in which to execute response actions, having the staging area located slightly farther away from the Inlet than one would want

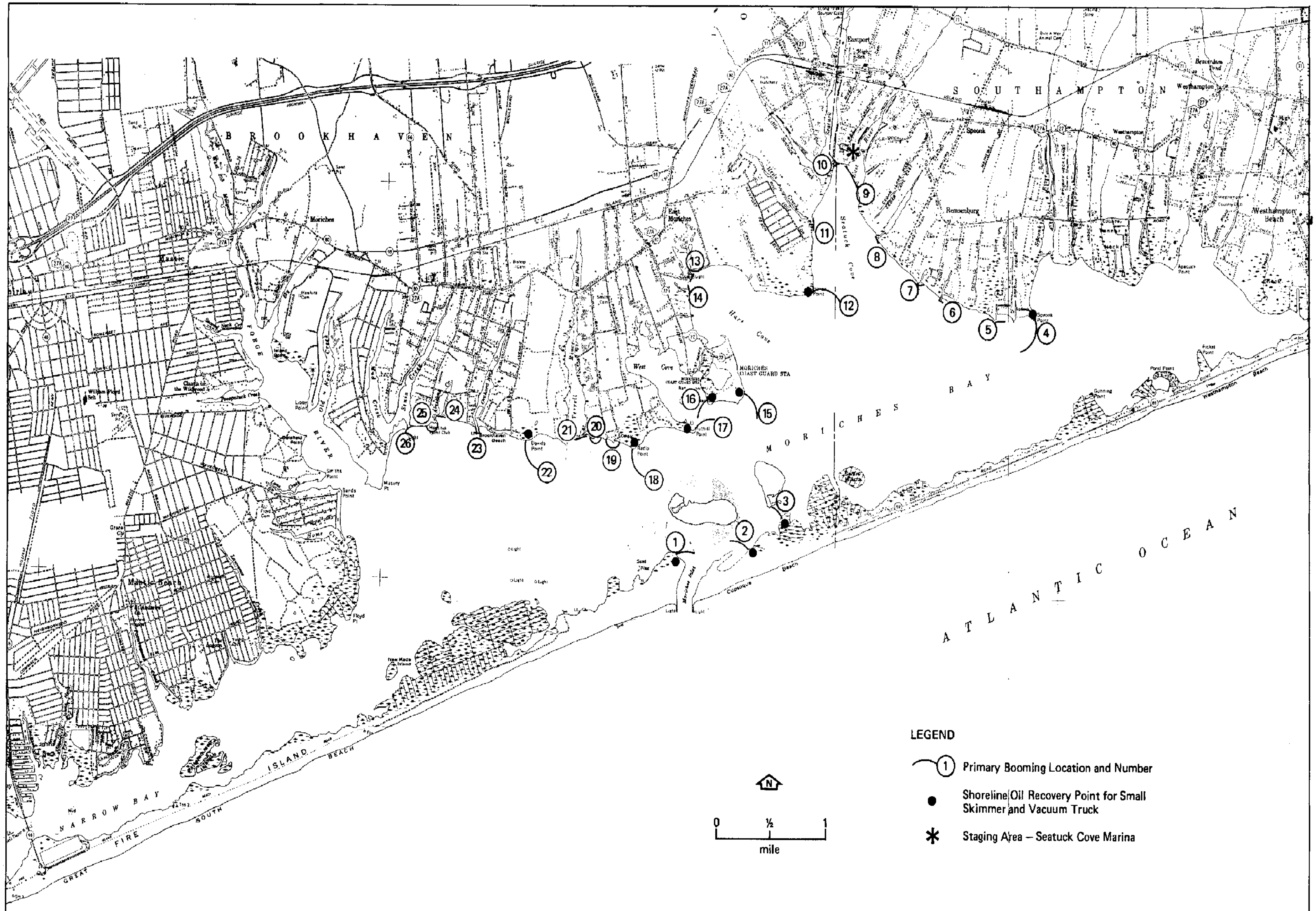


Figure 9 RESPONSE ACTION LOCATIONS

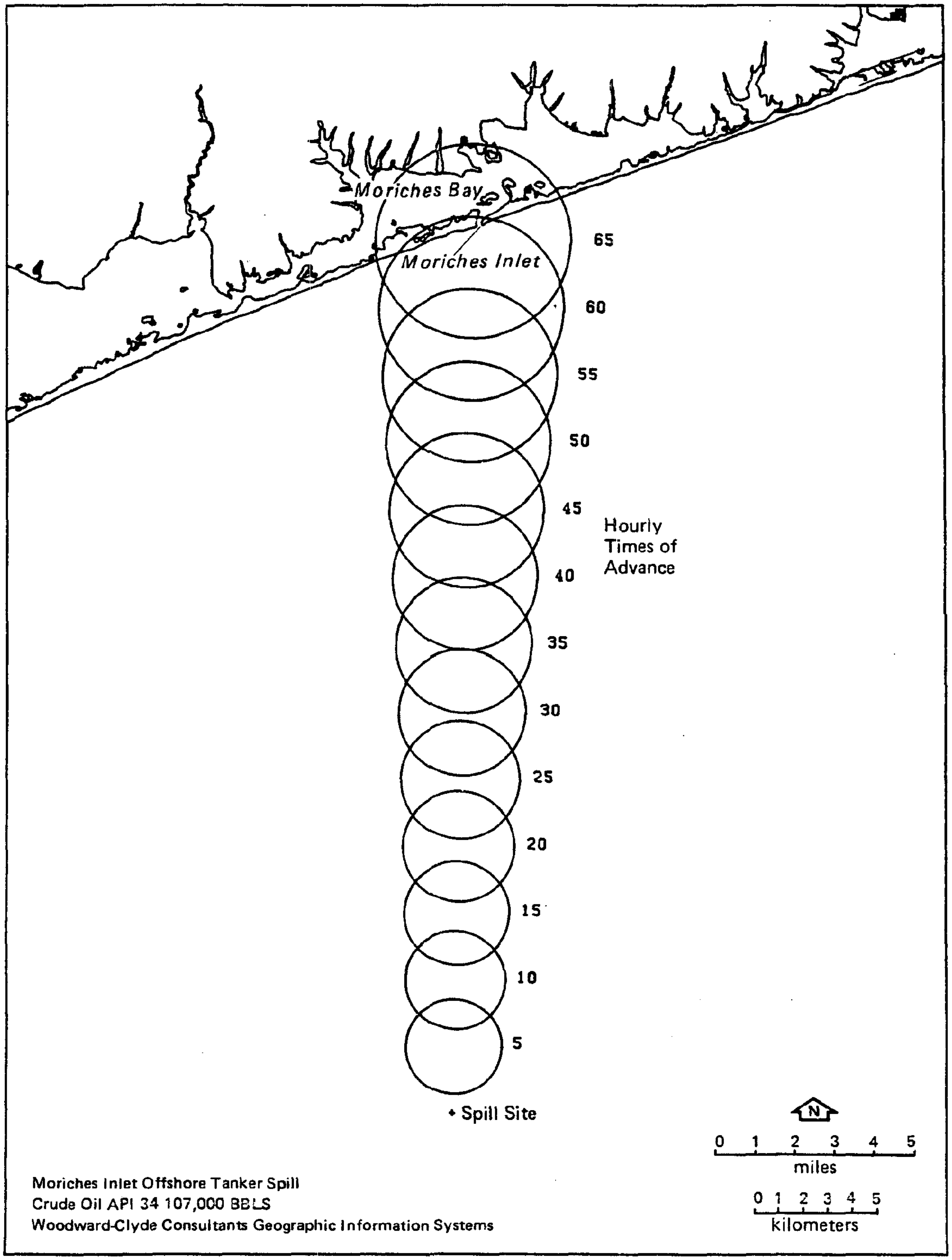


Figure 4. SPILL TRAJECTORY MODEL

tive loss due to factors such as an 80°F air temperature and an increased slick surface area (30 square miles after 60 hours) resulting from spreading. The thickness of the slick decreases from 1.40 mm at 5 hours, to 0.23 mm at 60 hours. The evaporative loss would decrease the slick's volume by approximately 39 percent, from 107,000 to 65,200 barrels during the initial 60-hour period. The majority of this evaporative loss consists of the oil's toxic, low molecular weight hydrocarbon components such as benzene and toluene.

Upon reaching the shores of Long Island, the majority of the 4.68-mile diameter slick would wash onto Great South, Cupsogue and Westhampton Beaches, adjacent to Moriches Inlet. Determining how much of the slick would actually pass through the 800-foot-wide Inlet is difficult, but it is felt that a substantial entraining effect would occur near the Inlet and up to 20 percent of the slick (13,000 barrels) would enter Moriches Bay.

Oil entering the Inlet would initially contaminate both sides of the Inlet itself and the islands immediately to the north and east. From there the slick would be carried west toward the Forge River and east toward Hart and Seatuck coves. Currents are rapid right at the Inlet, attaining velocities of approximately 2 knots. These currents slow to 1 to 1.5 knots near the adjacent islands. Once inside the main portions of Moriches Bay, current velocities drop to 0.6 knot or less, with the southern part of the Bay having slightly faster currents than the northern section. These minimal currents would help to limit oil slick movement and contamination once inside the Bay. Figure 5 shows both the hourly incursions of oil in Moriches Bay as well as the extent of shoreline contamination without the implementation of the recommended response actions. Roughly five miles of barrier island beach would

Table 1. BOOMING LOCATIONS AND EQUIPMENT/MANPOWER REQUIREMENTS

| Location and Booming Number | Length and Boom Type Required | Equipment & Manpower Required to Deploy & Maintain Booms & Skim Oil[a] | Estimated Response Time From Seatuck Cove Marina | First Day Response Action Cost[b] |
|---|---|---|---|---|
| 1. Moriches Inlet West Diversion Booming | 1000 ft. Optimax Curtain Boom | 1-Boat w/3-man crew would remain to tend boom<br>1-Vacuum truck and 2-man crew w/small skimmer on shore<br>4-Anchors | 2.0 hr | $1600 |
| 2. Cupsogue Beach Diversion Booming | 1000 ft. Optimax Curtain Boom | 1-Boat w/3-man crew would remain to tend boom<br>1-Vacuum truck and 2-man crew w/small skimmer on shore<br>4-Anchors | 1.9 hr | $1600 |
| 3. Cupsogue Beach to Unnamed Island Exclusion Booming | 1000 ft. Optimax Curtain Boom | 1-Boat w/3-man crew<br>1-Vacuum truck and 2-man crew w/small skimmer on shore<br>4-Anchors | 1.8 hr | $1600 |
| 4. Speonk Point Diversion Booming | 1500 ft. Optimax Curtain Boom | 1-Boat w/3-man crew would remain to tend boom<br>5-Anchors | 2.0 hr | $1100 |
| 5. Westhampton Yacht Squadron Exclusion Booming | 200 ft. Optimax Curtain Boom | 1-Boat w/2-man crew<br>2-Anchors | 1.0 hr | $300 |
| 6. Seatuck Cove #2 Exclusion Booming | 200 ft. Optimax Curtain Boom | 1-Boat w/2-man crew<br>2-Anchors | 0.9 hr | $300 |
| 7. Seatuck Cove #1 Exclusion Booming | 200 ft. Optimax Curtain Boom | 1-Boat w/2-man crew<br>2-Anchors | 0.9 hr | $300 |
| 8. Fish Creek Exclusion Booming | 200 ft. Optimax Curtain Boom | 1-Boat w/2-man crew<br>2-Anchors | 0.7 hr | $300 |
| 9. East River Exclusion Booming | 1200 ft. Optimax Curtain Boom | 1-Boat w/3-man crew would remain to tend boom<br>5-Anchors | --- | $1000 |
| 10. Seatuck Creek Exclusion Booming | 200 ft. Optimax Curtain Boom | 1-Boat w/2-man crew<br>2-Anchors | 0.6 hr | $300 |

Table 1. BOOMING LOCATIONS AND EQUIPMENT/MANPOWER REQUIREMENTS (continued)

| Location and Booming Number | Length and Boom Type Required | Equipment & Manpower Required to Deploy & Maintain Booms & Skim Oil[a] | Estimated Response Time From Seatuck Cove Marina | First Day Response Action Cost[b] |
|---|---|---|---|---|
| 11. Heils Creek Exclusion Booming | 200 ft. Optimax Curtain Boom | 1-Boat w/2-man crew<br>2-Anchors | 0.7 hr | $300 |
| 12. Haven Point Diversion Booming | 1500 ft. Optimax Curtain Boom | 1-Boat w/3-man crew would remain to tend boom<br>1-Vacuum truck and 2-man crew w/small skimmer on shore<br>5-Anchors | 1.8 hr | $1800 |
| 13. Maple Ave. Marinas Exclusion Booming | 200 ft. Optimax Curtain Boom | 1-Boat w/2-man crew<br>2-Anchors | 1.0 hr | $300 |
| 14. Harts Cove Marina Exclusion Booming | 200 ft. Optimax Curtain Boom | 1-Boat w/2-man crew<br>2-Anchors | 1.0 hr | $300 |
| 15. Hart Cove Diversion Booming | 1500 ft. Optimax Curtain Boom | 1-Boat w/3-man crew would remain to tend boom<br>1-Vacuum truck and 2-man crew w/small skimmer on shore<br>5-Anchors | 2.0 hr | $1800 |
| 16. West Cove Diversion Booming | 1500 ft. Optimax Curtain Boom | 1-Boat w/3-man crew would remain to tend boom<br>1-Vacuum truck and 2-man crew w/small skimmer on shore<br>5-Anchors | 2.1 hr | $1800 |
| 17. Tuthill Point Diversion Booming | 1500 ft. Optimax Curtain Boom | 1-Boat w/3-man crew would remain to tend boom<br>1-Vacuum truck and 2-man crew w/small skimmer on shore<br>5-Anchors | 2.1 hr | $1800 |
| 18. Radio Point Diversion Booming | 1500 ft. Optimax Curtain Boom | 1-Boat w/3-man crew would remain to tend boom<br>1-Vacuum truck and 2-man crew w/small skimmer on shore<br>5-Anchors | 2.2 hr | $1800 |

Table 1. BOOMING LOCATIONS AND EQUIPMENT/MANPOWER REQUIREMENTS (concluded)

| Location and Booming Number | Length and Boom Type Required | Equipment & Manpower Required to Deploy & Maintain Booms & Skim Oil[a] | Estimated Response Time From Seatuck Cove Marina | First Day Response Action Cost[b] |
|---|---|---|---|---|
| 19. Tadsens Fishing Station Exclusion Booming | 500 ft. Optimax Curtain Boom | 1-Boat w/2-man crew<br>3-Anchors | 1.3 hr | $400 |
| 20. Cerullo Bros. Fishing Station Exclusion Booming | 200 ft. Optimax Curtain Boom | 1-Boat w/2-man crew<br>2-Anchors | 1.3 hr | $300 |
| 21. Terrell River Exclusion Booming | 200 ft. Optimax Curtain Boom | 1-Boat w/2-man crew<br>2-Anchors | 1.3 hr | $300 |
| 22. Davids Point Diversion Booming | 1500 ft. Optimax Curtain Boom | 1-Boat w/3-man crew would remain to tend boom<br>1-Vacuum truck and 2-man crew w/small skimmer on shore<br>5-Anchors | 2.4 hr | $1800 |
| 23. Orchard Neck Creek Exclusion Booming | 200 ft. Optimax Curtain Boom | 1-Boat w/2-man crew<br>2-Anchors | 1.5 hr | $300 |
| 24. Areskonk Creek Exclusion Booming | 200 ft. Optimax Curtain Boom | 1-Boat w/2-man crew<br>2-Anchors | 1.6 hr | $300 |
| 25. Moriches Yacht Club Exclusion Booming | 300 ft. Optimax Curtain Boom | 1-Boat w/2-man crew<br>2-Anchors | 1.7 hr | $350 |
| 26. Senix Creek Exclusion Booming | 200 ft. Optimax Curtain Boom | 1-Boat w/2-man crew<br>2-Anchors | 1.7 hr | $300 |

[a]Source: C.R. Foget, et al. 1979.

[b]Source: C.R. Foget 1981.

in a minimum response time situation should pose no problem. The use of the Moriches Coast Guard Station as a staging area would not be feasible due to the incompatibility of response vessels with the Coast Guard's rail boat launch system (theirs is not a standard boat ramp). Also, vessels launched there must pass through their boat house, which could pose problems. If storage space or additional land-staging areas are necessary during a response effort, the Coast Guard station could be used for these purposes.

The boom deployed on the west side of the Inlet should be effective in containing oil because it is situated in a back eddy area with slower (less than one knot) currents. The boom terminates on a sandy beach with vehicular access, making for easier and more efficient pickup of oil. Since the two booms terminating on the north shore of Cupsogue Beach are deployed in waters having maximum current velocities in excess of one knot, their effectiveness would be limited. However, the use of these locations as booming sites (in conjunction with small skimmers) is deemed necessary so as to limit the quantity of oil spreading into Moriches Bay. This is an important consideration because the self-propelled skimmers normally used to clean up large amounts of oil are not capable of operating in the Bay's shallow waters.

Estimated spill response times are given in this report for two cases. The first case is for a response effort mounted by local spill contractors. The total response times for boom deployment at each location for this contractor mounted effort are given in Table 2. These response times vary in time between 6 and 10 hours. The response times take into account a 6-hour period (average taken from Table 3) for the contractors to transport their

Table 2. ESTIMATED DEPLOYMENT TIMES FOR CONTRACTOR MOUNTED RESPONSE ACTIONS

| | Average Minimum Response Time to Seatuck Cove Marina | Booming Location | Travel Time to Boom Deployment Location (hours) | Time Required to Deploy Boom at Location (hours) | Lag Time (hours) | Total Response Time (hours) |
|---|---|---|---|---|---|---|
| Response by contractors with their own equipment | 6.0 | 1 - Moriches Inlet-West | 0.8 | 1.2 | 1.4 | 9.4 |
| | 6.0 | 2 - Cupsogue Beach | 0.7 | 1.2 | 1.4 | 9.3 |
| | 6.0 | 3 - Cupsogue Beach to Unnamed Island | 0.6 | 1.2 | 1.4 | 9.2 |
| | 6.0 | 4 - Speonk Point | 0.5 | 1.5 | 1.4 | 9.4 |
| | 6.0 | 5 - Westhampton Yacht Squadron | 0.5 | 0.5 | 0 | 7.0 |
| | 6.0 | 6 - Seatuck Cove #2 | 0.4 | 0.5 | 0 | 6.9 |
| | 6.0 | 7 - Seatuck Cove #1 | 0.4 | 0.5 | 0 | 6.9 |
| | 6.0 | 8 - Fish Creek | 0.2 | 0.5 | 0 | 6.7 |
| | 6.0 | 9 - East River | --- | 1.3 | 1.4 | 8.7 |
| | 6.0 | 10 - Seatuck Creek | 0.1 | 0.5 | 1.4 | 8.0 |
| | 6.0 | 11 - Heils Creek | 0.2 | 0.5 | 1.4 | 8.1 |
| | 6.0 | 12 - Haven Point | 0.3 | 1.5 | 1.4 | 9.4 |
| | 6.0 | 13 - Maple Ave. Marinas | 0.5 | 0.5 | 0 | 7.0 |
| | 6.0 | 14 - Harts Cove Marina | 0.5 | 0.5 | 0 | 7.0 |
| | 6.0 | 15 - Hart Cove | 0.5 | 1.5 | 1.4 | 9.4 |
| | 6.0 | 16 - West Cove | 0.6 | 1.5 | 1.4 | 9.5 |
| | 6.0 | 17 - Tuthill Point | 0.6 | 1.5 | 1.4 | 9.5 |
| | 6.0 | 18 - Radio Point | 0.7 | 1.5 | 1.4 | 9.6 |
| | 6.0 | 19 - Tadsens Fishing Station | 0.7 | 0.6 | 0 | 7.3 |
| | 6.0 | 20 - Cerullo Bros. Fishing Station | 0.8 | 0.5 | 0 | 7.3 |
| | 6.0 | 21 - Terrell River | 0.8 | 0.5 | 0 | 7.3 |
| | 6.0 | 22 - Davids Point | 0.9 | 1.5 | 1.4 | 9.8 |
| | 6.0 | 23 - Orchard Neck Creek | 1.0 | 0.5 | 0 | 7.5 |
| | 6.0 | 24 - Areskonk Creek | 1.1 | 0.5 | 0 | 7.6 |
| | 6.0 | 25 - Moriches Yacht Club | 1.1 | 0.6 | 0 | 7.7 |
| | 6.0 | 26 - Senix Creek | 1.2 | 0.5 | 0 | 7.7 |

Table 3. ESTIMATED RESPONSE TIMES FOR OIL SPILL CONTRACTORS IN THE MORICHES INLET AREA (To Seatuck Cove Marina)

| Contractor | Distance to Inlet | Mobilization Time[a] | Travel Time[b] | Boom Deployment Time[c] | Boat Deployment Time | Total Response Time |
|---|---|---|---|---|---|---|
| Clean Harbors (Verrazano Bridge) | 80 mi | 1.5 hrs | 2.0 hrs | Compactible--1 hr<br>Standard--2 hrs | 0.25 hr | 4.75 to 5.75 hrs |
| Clean Harbors (Upper Arthur Kill) | 85 mi | 1.5 hrs | 2.0 hrs | Compactible--1 hr<br>Standard--2 hrs | 0.25 hr | 4.75 to 5.75 hrs |
| Clean Harbors (Perth Amboy) | 95 mi | 1.5 hrs | 2.5 hrs | Compactible--1 hr<br>Standard--2 hrs | 0.25 hr | 5.25 to 6.25 hrs |
| Clean Venture (Linden) | 90 mi | 1.5 hrs | 2.25 hrs | Standard--2 hrs | 0.25 hr | 6.0 hrs |
| Coastal Services (Elizabeth) | 85 mi | 1.5 hrs | 2.0 hrs | Standard--2 hrs | 0.25 hr | 5.75 hrs |
| Marine Pollution Control (Port Jefferson) | 25 mi | 1.5 hrs | .75 hr | Standard--2 hrs | 0.25 hr | 4.5 hrs |
| Clean Water (Toms River) | 135 mi | 1.5 hrs | 3.5 hrs | Standard--2 hrs | 0.25 hr | 7.25 hrs |
| AAA Pollution (Long Island City) | 80 mi | 1.5 hrs | 2.0 hrs | Standard--2 hrs | 0.25 hr | 5.75 hrs |
| Moran-Crowley (Carteret) | 90 mi | 1.5 hrs | 2.25 hrs | Standard--2 hrs | 0.25 hr | 6.0 hrs |

[a] Includes 0.5 hr for notification and 1 hr to get equipment on the road.

[b] Average speed of 40 mph.

[c] Time required to unpack, assemble, and launch 1,000 ft of boom.

equipment to Seatuck Cove Marina and place the equipment into the water, ready for deployment. A lag time is added to half of the spill response times because only 13 boats are used to deploy boom at the 26 response action locations. A boat would deploy boom at an exclusion booming location, return to Seatuck Cove Marina, and tow boom to a diversion booming location, where it would then remain to move and tend the boom once it was in place. Since there is more than adequate time (60 plus hours) in which to execute all required spill response actions, it is not necessary to have one boat respond simultaneously to each booming location, although this is possible if there is only limited time in which to mount a response. Having fewer boats towing long (up to 1500 feet) lengths of boom would help to limit boat traffic and congestion in and around Seatuck Cove Marina.

The second case considers a spill response effort mounted by the Suffolk County Police Department, U. S. Coast Guard, or other local groups using equipment that was stored locally, i.e., at Seatuck Cove Marina, Moriches Coast Guard Station, etc. The total response times for this case are given in Table 4. As one can see from Table 4, response times are 5 hours quicker when the 21,100 feet of boom necessary to execute the response actions is stored near Moriches Inlet, and the response effort is carried out by a local group. However, in this scenario, since there is more than adequate time for response prior to the oil's arrival in Moriches Bay, the storage of oil spill equipment locally is not necessary.

In both cases, boom deployment does not have to follow a priority sequence based on environmental or economic sensitivity due to the distant nature of the spill.

The total response times given were calculated under optimum conditions.

Table 4. ESTIMATED DEPLOYMENT TIMES FOR LOCALLY MOUNTED RESPONSE ACTIONS

| | Average Minimum Response Time to Seatuck Cove Marina | Booming Location | Travel Time to Boom Deployment Location (hours) | Time Required to Deploy Boom at Location (hours) | Lag Time (hours) | Total Response Time (hours) |
|---|---|---|---|---|---|---|
| Response by U.S. Coast Guard or local group if oil spill equipment is stored locally (i.e., at Moriches Coast Guard Station or Seatuck Cove Marina). Vacuum trucks are supplied by local contractors. | 1.0 | 1 - Moriches Inlet-West | 0.8 | 1.2 | 1.4 | 4.4 |
| | 1.0 | 2 - Cupsogue Beach | 0.7 | 1.2 | 1.4 | 4.3 |
| | 1.0 | 3 - Cupsogue Beach to Unnamed Island | 0.6 | 1.2 | 1.4 | 4.2 |
| | 1.0 | 4 - Speonk Point | 0.5 | 1.5 | 1.4 | 4.4 |
| | 1.0 | 5 - Westhampton Yacht Squadron | 0.5 | 0.5 | 0 | 2.0 |
| | 1.0 | 6 - Seatuck Cove #2 | 0.4 | 0.5 | 0 | 1.9 |
| | 1.0 | 7 - Seatuck Cove #1 | 0.4 | 0.5 | 0 | 1.9 |
| | 1.0 | 8 - Fish Creek | 0.2 | 0.5 | 0 | 1.7 |
| | 1.0 | 9 - East River | --- | 1.3 | 1.4 | 3.7 |
| | 1.0 | 10 - Seatuck Creek | 0.1 | 0.5 | 1.4 | 3.0 |
| | 1.0 | 11 - Heils Creek | 0.2 | 0.5 | 1.4 | 3.1 |
| | 1.0 | 12 - Haven Point | 0.3 | 1.5 | 1.4 | 4.4 |
| | 1.0 | 13 - Maple Ave. Marinas | 0.5 | 0.5 | 0 | 2.0 |
| | 1.0 | 14 - Harts Cove Marina | 0.5 | 0.5 | 0 | 2.0 |
| | 1.0 | 15 - Hart Cove | 0.5 | 1.5 | 1.4 | 4.4 |
| | 1.0 | 16 - West Cove | 0.6 | 1.5 | 1.4 | 4.5 |
| | 1.0 | 17 - Tuthill Point | 0.6 | 1.5 | 1.4 | 4.5 |
| | 1.0 | 18 - Radio Point | 0.7 | 1.5 | 1.4 | 4.6 |
| | 1.0 | 19 - Tadsens Fishing Station | 0.7 | 0.6 | 0 | 2.3 |
| | 1.0 | 20 - Cerullo Bros. Fishing Station | 0.8 | 0.5 | 0 | 2.3 |
| | 1.0 | 21 - Terrell River | 0.8 | 0.5 | 0 | 2.3 |
| | 1.0 | 22 - Davids Point | 0.9 | 1.5 | 1.4 | 4.8 |
| | 1.0 | 23 - Orchard Neck Creek | 1.0 | 0.5 | 0 | 2.5 |
| | 1.0 | 24 - Areskonk Creek | 1.1 | 0.5 | 0 | 2.6 |
| | 1.0 | 25 - Moriches Yacht Club | 1.1 | 0.6 | 0 | 2.7 |
| | 1.0 | 26 - Senix Creek | 1.2 | 0.5 | 0 | 2.7 |

Calls for assistance during nonworking hours (nights, weekends, holidays, etc.), poor road conditions, heavy road traffic, or inclement weather would increase these times by a factor of two or three. Also, anywhere from three to ten hours would be required for vacuum truck arrival in both cases.

The estimated costs for implementation of spill response actions at each location during the first day (10 working hours) are given in Table 1. The total amount of equipment required and their rental costs are listed in Table 5. The total number of man hours required and labor rates are given in Table 6. The $16,750 equipment rental cost and $14,250 labor cost give a total first day response action cost of approximately $31,000. This daily total cost would probably increase on subsequent days as additional booms, boats, and vacuum trucks were used and shoreline cleanup operations initiated.

Due to the abundance of shallow water (see Figures 6, 7, and 8) in Moriches Bay, self-propelled skimmers could not be employed to help pick up oil. Six of the seven self-propelled skimmers available in the New York City area require a six foot operational depth (the seventh requires four feet), and although there is water of at least this depth in Moriches Bay, the Coast Guard recommends that boats with drafts greater than three feet not navigate there because of the exceedingly rapid manner in which shoals and the Bay bottom change. An LCI skimmer available through Moran-Crowley Environmental Services could be used for open water skimming. Although it has a draft of three feet, its operation in Moriches Bay could be made difficult or unfeasible because of the shallow waters. Two boats with 100-foot boom sections would be required to tow the skimmer.

In the absence of self-propelled skimmers, booms of up to 1000 feet in length deployed between two boats in a "U" configuration could be used

Table 5. EQUIPMENT RENTAL COST FOR ONE 10-HOUR DAY

| Equipment | Amount/Number Required | Rental Cost | Total Cost |
|---|---|---|---|
| Boom | 21,300 ft | $0.35/ft | $ 7500 |
| Work Boats | 23 | 200/day | 4600 |
| Small Skimmers | 13 | 50/day | 650 |
| Vacuum Trucks | 10 | 300/day | 3000 |
| LPI Skimmer | 1 | 1000/day | 1000 |
| | TOTAL | | $ 16,750 |

Table 6. LABOR COST FOR ONE 10-HOUR DAY

| Activity | Man Hours Required in 10-Hour Day | Labor Rate | Total Cost |
|---|---|---|---|
| Boom Deployment | 150 | $ 15.00/hr | $2,250 |
| Boom Maintenance | 240 | 15.00/hr | 3,600 |
| Skimmer Maintenance | 200 | 15.00/hr | 3,000 |
| Vacuum Truck Support | 100 | 15.00/hr | 1,500 |
| Oil Herding Boats | 180 | 15.00/hr | 2,700 |
| LPI Skimmer Operation (including boats) | 60 | 15.00/hr | 900 |
| Miscellaneous | 20 | 15.00/hr | 300 |
| Total | 890 | Total | $14,250 |

to corral oil in open waters. A skimmer deployed from a third boat, used in conjunction with a floating storage tank, would be used to pick up oil collected by the boom. Three such systems, requiring a total of nine boats, three small skimmers, and 3,000 feet of boom, could operate simultaneously in Moriches Bay (one each in the western, central, and eastern portions of the Bay).

Using chemical dispersants to treat the large oil mass while it is still offshore could limit or prevent contamination of the barrier island beaches adjacent to Moriches Inlet. These dispersants would be applied through either vessel or airborne spraying systems. Application of chemical dispersants to the slick causes the oil to break into small droplets, which, in the presence of wave energy, mix into the water column, forming a plume. Dispersant application enhances oil evaporation and biodegradation because the dispersed oil in droplet form has an increased surface area. Some of this dispersed oil below the surface would be carried by subsurface currents onto the beaches or through Moriches Inlet. However, impacts would be minimized because the quantity of oil reaching the barrier island beaches and Moriches Inlet and Bay would be decreased and because dispersed oil does not adhere to objects as readily as untreated oil. Some of this subsurface dispersed oil would be carried westward by longshore drift, threatening to contaminate shoreline many miles to the west of Moriches Inlet.

To lessen contamination of the ocean beaches, a 2-3 foot high berm could be constructed parallel to the shoreline at the mid-tide line. Motor graders would be best suited for berm construction, although bulldozers would be adequate also. Maintenance of the berm would include possible reconstruction daily.

Spill response activities conducted after the first day are beyond the scope of this report because of the difficulty in predicting spill behavior once oil has contacted a shoreline. Under the circumstances presented in this scenario, the cleaning of oil from water and shorelines could take up to 14 days.

## 5.5 EQUIPMENT PERFORMANCE

The use of American Marine Optimax Boom is recommended because it has performance characteristics (stability and shallow draft water use) well suited to the Moriches Bay region. Over 40,000 feet of this type of boom is available for use in the Long Island area, which greatly exceeds the 21,300 feet required to implement the predetermined response actions. Since there is adequate time in which to mount the response, booms would be layed out in the water at Seatuck Cove Marina and towed by boat to the various booming locations. If the time in which to implement responses was limited, booms could be carried inside boats to the sites. This would decrease response times because a boat carrying boom can travel at approximately 20 knots, as compared to 2-4 knots for a boat towing boom. Kepner Super-compactible boom is well suited for this because it can be compacted and transported in a minimum of space. Over 15,000 feet of this Super-compactible boom is available for use in the area.

The 10 skimmers used at shoreline oil recovery points would have the capacity to pick up 300 barrels (12,600 gallons) per day. The three skimmers used to collect oil herded by boats with "U" configuration booms could recover approximately 100 barrels (4200 gallons) daily. The LPI skimmer could clean up 150 barrels (6300 gallons) daily. Total oil recovery capacity of all these skimmers for a 10-hour day would be 550 barrels (23,100 gallons). Oil recovery by skimmers would probably decrease on subsequent days as slick thickness decreased with continued slick spreading. Skimmer effectiveness increases with increasing slick thickness.

As more oil became stranded on the channel shorelines, beach and shoreline oil recovery would be enhanced. Elevating scrapers, motor graders, and front-end loaders could be used to clean oil from sandy beach areas. Manual labor would be used to clean shoreline areas not accessible to motorized vehicles.

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## APPENDIX A

### Review of Comments Submitted by Parties Interested in Oil Spill Control

1. John Black, Regional Marine Resources Council

   Comment: What is done with the collected oil? What percentage of the collected liquid is oil?

   Response: The oil is pumped into oil tankers and shipped to a refinery. The oily waste is landfilled. Approximately 80-90% of the collected liquid is oil.

2. Richard Miller, Executive Secretary, L.I. Fishermen's Assoc.

   Comment: The use of dispersants will destroy marine life.

   Response: The use of dispersants as proposed in the scenario for Moriches Inlet will prevent an oil slick from entering Moriches Bay which supports extensive marine life for both commercial and recreational purposes. The oil dispersed in the open ocean will have an increased surface area thereby facilitating its biodegradation and evaporation. The impact on marine life will be minimal. Permission from the federal government is needed prior to use of dispersants. The federal policy on dispersal use is presently being re-evaluated. The use of dispersants probably will become a more commonly used alternative in combating oil spills.

3. Robert Smolker, Regional Marine Resources Council

   Comment: The control of boat traffic is not mentioned in the report.

   Response: It is assumed that the U.S. Coast Guard will utilize their authority to control boat traffic.

   Comment: Reynolds Channel and adjacent marshes are very important wintering areas for brant. It would be a good idea to deploy devices such as air guns to disturb the brant and deter them from using an area where oil has collected.

   Response: It is so noted.

APPENDIX B

Part I - Inventory of Oil Spill Contractors and Equipment in the Long Island Region

In the event of an oil spill, an efficient and effective response is essential and can be achieved partially by familiarization with the contractors and equipment available for use in combatting oil spills. This Appendix identifies the local contractors and various operational aspects of oil spill equipment available in the Long Island area.

The type, manufacturer, quantity and location of the oil spill equipment owned by each contractor is listed in Table 1. Equipment which can be operated effectively in shallow water is denoted with an asterisk.

The rental costs for use of oil spill cleanup equipment are competitive and standardized throughout the industry. The costs are, however, subject to frequent change as are the equipment inventories of the various contractors. Table 2 gives the present rental costs for the equipment owned by two of the oil spill contractors listed in the previous table.

Equipment.

The primary types of equipment used in the containment and recovery of spilled oil are booms, skimmers and pumps. There are many varieties of each type of equipment available with some being better suited for certain purposes than others. A discussion of the characteristics of the different varieties of equipment is provided to enable the reader to determine which one is best suited for a specific purpose.

Booms. Booms are used primarily for containment or diverting spilled oil or for protecting areas from contamination. The brands of booms available from the various contractors are listed in Table 3 along with their specifications and capabilities.

Table 1. INVENTORY OF OIL SPILL CONTRACTORS EQUIPMENT

Clean Harbors Cooperative (Verrazano Bridge)(201) 738-2438

Booms

| | |
|---|---|
| *9,000 ft | American Marine Optimax 7" x 12" |
| 3,000 ft | Kepner Supercompactible Sea Curtain 12" x 18" |
| *5,000 ft | Kepner Supercompactible Sea Curtain 8" x 12" |

Skimmers

| | |
|---|---|
| 1 | JDF 3003 self-propelled vessel |
| *1 | Centrifugal Systems Oil Mop w/500' of rope |
| 1 | Marco Class JD self-propelled vessel |

Boats

| | |
|---|---|
| *4 | Raider 34' work boats w/2 - 150 hp motors |
| *4 | Orca 22' deployment boats w/2 - 85 hp motors |

Oil/Water Separation Equipment

None

Clean Harbors Cooperative (Upper Arthur Kill)

Booms

| | |
|---|---|
| *14,000 ft | American Marine Optimax 7" x 12" |
| * 3,500 ft | Kepner Supercompactible Sea Curtain 8" x 12" |

Skimmers

| | |
|---|---|
| 2 | JBF 3003 self-propelled vessel |
| *1 | Centrifugal Systems Oil Mop w/500' of rope |

Boats

| | |
|---|---|
| *1 | Bennent 27' Sealander w/2 - 150 hp motors |
| *6 | Orca 22' deployment boats w/2 - 85 hp motors |

Oil/Water Separation Equipment

None

Clean Harbors Cooperative (Perth Amboy)

Booms

| | |
|---|---|
| *13,000 ft | American Marine Optimax 7" x 12" |
| * 3,500 ft | Kepner Supercompactible Sea Curtain 8" x 12" |

Table 1. Continued

---

Skimmers

| | |
|---|---|
| 1 | JBF 3003 self-propelled vessel |
| 1 | JBF 3001 self-propelled skimming vessel |
| 1 | Centrifugal Systems Oil Mop w/500' of rope |

Boats

| | |
|---|---|
| 1 | Bennett 27' Sealander w/2 - 150 hp motors |
| 5 | Orca 22' deployment boats w/2 - 85 hp motors |

Oil/Water Separation Equipment

None

AAA Pollution Specialist, Inc. (Long Island City, NY) 212-729-2122

Booms

| | |
|---|---|
| 5,500 ft | Uniroyal Sealdboom 6" x 12" |
| *3,000 ft | American Marine Optimax 7" x 12" |

Boats

| | |
|---|---|
| 2 | 30 ft work boats |
| 1 | 21 ft MAKO w/115 hp |
| *15 | small work boats w/outboard motors |

Skimmers

| | |
|---|---|
| *5 | ACME Model 400 skimmers |
| *2 | ACME FS-40 Electric skimmers |

Oil/Water Separation Equipment

| | |
|---|---|
| 4 | 3,000-5,000 gal vacuum trucks |
| 3 | 4,400 gal tank trucks |
| 5 | 3,000 gal tank trucks |

Spill Response Trailers

| | |
|---|---|
| 1 | 32' communications and repair trailer |

Communication Systems

| | |
|---|---|
| 6 sets | Walkie-talkies |
| 3 sets | Mobile units (in vehicles) |
| 1 | 55 channel marine band |

Table 1. Continued

Advanced Environmental Technology Corp. (Morris Plains, NJ) 201-539-7111

A New York State licensed collector and transporter of hazardous wastes.

Booms

None

Boats

None

Skimmers

None

Oil/Water Separation Equipment

None

Spill Response Trailers

| | |
|---|---|
| 4 | 22' trucks |
| 1 | 14' truck |
| 5 | 44' trucks |

Communication Systems

| | |
|---|---|
| 12 sets | Civilian band radios |

Clean Venture (Linden, NJ) 201-862-5500

Booms

| | |
|---|---|
| *13,000 ft | 6" x 12" harbor boom |
| 2,000 ft | 12" x 24" Goodyear offshore inflatable high seas barrier boom |

Boats

| | |
|---|---|
| 1 | 42' LCM twin screw 280 hp, 18 ton DWT |
| 2 | 30' steel work boat |
| 1 | 30' steel harbor tug |
| *6 | 22' work boats |
| *20 | 15'-19' work boats |

Table 1. Continued

| | |
|---|---|
| **Skimmers** | |
| 1 | Bennett Mark 6E oil skimmer |
| *4 | Swiss Oela skimmers |
| *4 | Duck bill skimmers |
| *1 | MK 209 oil mop skimmer & 300' mop |
| **Oil/Water Separation Equipment** | |
| 3 | 5,000 gal vacuum tractor trailer trucks |
| 3 | 2,500 gal vacuum trucks (straight) |
| 1 | 3,400 gal vacuum tractor trailer trucks |
| 1 | 4,200 gal vacuum tractor trailer trucks |
| **Communication Systems** | |
| 10 sets | Communication trailer 8' x 35' roadable - marine and land lease communications (Motorola) |
| 19 sets | Hand-held walkie-talkies |
| **Spill Response Trailer** | |
| 1 | 8' x 40' roadable - user: change area, eating area, first aid, shelter |

Clean Water, Inc. (Toms River, NJ) 201-341-3600

Ship salvage and oil spill consultants - affiliated with Smit International (America), Inc.

| | |
|---|---|
| **Booms** | |
| * 4,000 bags | Filter Fence Sorbent C (Biodegradable) 4 cu ft 18 lb/bag |
| * 4,000 ft | 5' filter boom (in one trailer) |
| 2,250 ft | Harbor boom 8" x 24" |
| 11,000 ft | Sea sentry boom 12" x 24" |
| **Boats** | |
| None | |
| **Skimmers** | |
| None | |
| **Oil/Water Separation Equipment** | |
| 2 | 12' x 4' x 5' API separators |

Table 1. Continued

| | |
|---|---|
| **Spill Response Trailers** | |
| 1 | 40' parts trailer |
| **Communication Systems** | |
| 3 sets | VHF 14 channel |
| 8 sets | Walkie-talkies |
| **Special Equipment** | |
| * 1 | K350 36" wide track front end loader (marshland work) |
| *14 | Mortar pans (marshland work) |
| 1 | International boom truck w/winch and boom (marshland work) |

**Marine Pollution Control (Port Jefferson, NY) 516-473-9132**

| | |
|---|---|
| **Booms** | |
| *5,000 ft | MPC harbor boom 6" x 12" |
| 2,000 ft | Uniroyal Sealdboom 6" x 12" |
| **Boats** | |
| 1 | 65' utility boat |
| 1 | 60' crew boat |
| 1 | 40' crew boat |
| 3 | 56' LCM-6 |
| 1 | 50' LCM |
| *2 | 24' workboat |
| *2 | 18' outboard workboat |
| *2 | 12' aluminum workboat |
| 1 | Boston Whaler w/50 hp motor |
| 1 | Debris boat (Boatadozer) |
| 1 | 80' salvage barge w/60 ton crane |
| 1 | 10,000 gal vacuum barge |
| **Skimmers** | |
| *2 | Parker weir type (Oil Hawg) |
| *2 | Slurp weir type |
| **Oil/Water Separation Equipment** | |
| 3 | 2,500 gal vacuum trucks |
| 1 | 1,100 gal skid mounted vacuum unit |
| 1 | 8,200 vacuum truck trailer & tractor |

Table 1. Continued

<u>Spill Response Trailers</u>

None

<u>Communication Systems</u>

| | |
|---|---|
| 15 sets | VHF ship-to-shore units in boats and vehicles |

<u>Moran-Crowley Environmental Services Company (Carteret, NJ) 201-499-9777</u>

<u>Booms</u>

| | |
|---|---|
| *5,000 ft | Harbor boom 6" x 12" |

<u>Boats</u>

| | |
|---|---|
| *5 | 18' aluminum boats |
| *3 | 21' workboats |

<u>Skimmers</u>

| | |
|---|---|
| 1 | 33' LPI skimmer |
| *2 | Metropet skimmers |

<u>Oil/Water Separation Equipment</u>

| | |
|---|---|
| 1 | 5,000 gal vacuum truck |
| 2 | 3,000 gal vacuum trucks |
| 1 | 3,000 gal stainless steel vacuum truck |
| 7 | 5,000 gal stainless steel storage tanks |

<u>Spill Response Trailers</u>

| | |
|---|---|
| 1 | 20' Command Port Travel-all |

<u>Communication Systems</u>

| | |
|---|---|
| 6 sets | Walkie-talkies (marine band) |
| 1 set | 40 channel marine band |

<u>New England Pollution Control (Norwalk, CT) 203-853-1990</u>

<u>Booms</u>

| | |
|---|---|
| *2,000 ft. | Harbor boom 6" x 12" |
| 2,000 ft. | Harbor boom 6" x 18" |
| *1,000 ft. | Inshore 6" x 6" |

Table 1. Continued

| | |
|---|---|
| **Boats** | |
| *4 | 15 and 18' workboats (up to 40 hp) |
| 1 | 65' work barge |
| **Skimmers** | |
| *2 | Swiss Oela |
| *6 | Skim Pak |
| *2 | Slick Bar Manta Ray |
| **Oil/Water Separation Equipment** | |
| 1 | 6,000 gal vacuum truck |
| 1 | 3,500 gal vacuum truck |
| 1 | 3,000 gal vacuum truck |
| **Spill Response Trailers** | |
| 1 | 24' Command trailer |
| **Communication Systems** | |
| 4 | Hand-held Motorola (USCG Freq.) & base station |
| **Peabody Clean Industry, Inc. (Perth Amboy) 201-925-6010 and Staten Island 212-729-2121** | |
| **Booms** | |
| *2,200 ft. | Coastal boom 4" x 14" |
| 2,300 ft. | Coastal boom 12" x 24" |
| **Boats** | |
| 1 | 16' aluminum whaler 100 hp |
| 2 | 18' flat bottom boats 25 hp |
| *1 | 16' work boat 15 hp |
| *1 | 14' work boat |
| **Skimmers** | |
| *2 | Swiss Oela skimmer |
| *6 | Slurp skimmer |
| 1 | Mash 400 skimmer |
| *3 | Parker weir skimmers (Oil Hawg) |

Table 1. Continued

| | |
|---|---|
| <u>Oil/Water Separation Equipment</u> | |
| 2 | 3,000 gal vacuum trucks (straight) |
| 5 | 6,000 gal vacuum trucks (tractor trailer) |
| 1 | 4,000 gal vacuum truck |
| 2 | 3,500 gal vacuum trucks |
| 1 | Vactor unit (large material mover) |
| <u>Spill Response Trailers</u> | |
| 1 | Mobile Field Office & Communication Center (in Boston) |
| <u>Communication Systems</u> | |
| 10 sets | Walkie-talkies |

Table 2. EQUIPMENT RENTAL COSTS

| Contractor and Equipment | Rental Costs |
|---|---|
| Marine Pollution Control | |
| All Boom | $0.33/ft/day ($1.15/ft cleaning) |
| Slurp Skimmer | $46.00 |
| Parker Skimmer | $46.00/day |
| 80 ft Salvage Barge w/ 60 ton Crane | $115.00/hour |
| 65 ft Utility Boat | $60.00/hour |
| 60 ft Crewboat | $60.00/hour |
| 40 ft Crewboat | $50.00/hour |
| 56 ft LCM-6 | $60.00/hour |
| 50 ft LCM | $60.00/hour |
| 24 ft Workboat | $35.00/hour |
| 18 ft Outboard Workboat | $15.00/hour |
| 12 ft Aluminum Workboat | $85.00/day |
| Boston Whaler (50 hp) | $15.00/hour |
| Boatadozer | $35.00/hour |
| 2,500 gal Vacuum Truck | $37.00/hour |
| 1,100 gal Vacuum Unit (skid mount) | $29.00/hour |
| 8,200 gal Vacuum Truck Trailer & Tractor | $51.00/hour |
| 10,000 gal Vacuum Barge | $60.00/hour |
| Clean Venture | |
| Boom up to 18 in. | $0.35/ft/day |
| Boom over 18 in. | $0.40/ft/day |
| Bennet Mark 6E Skimmer | $260.00/hour |
| MK 209 Oil Mop | $70.00/hour |

Table 2. Concluded

| Contractor and Equipment | Rental Costs |
|---|---|
| Slurp Skimmer | $60.00/day |
| Swiss Skimmer | $60.00/day |
| Oil Hawg Skimmer | $300.00/day |
| Duckbill Skimmer | $60.00/day |
| 30 ft Harbor Tug | $37.00/hour |
| 22 ft Workboat | $28.00/hour |
| 15-19 ft Power Workboats | $150.00/day |
| Vacuum Trucks (Tractor-Trailer) | $47.50/hour |
| Vacuum Trucks (Straight Job) | $41.00/hour |
| Vacuum Unit (Skid Mount) | $27.00/hour |
| Tractor Trailer w/Pumps | $33.50/hour |

Skimmers. Skimmers are the primary means by which oil is recovered from the water surface. They work on a variety of principles with their effectiveness being dependent on the environmental conditions and oil type. Table 4 lists the skimmers available locally and their specifications and capabilities. The majority of skimmers are small, portable units with the remainder being mounted externally or internally to a vessel.

Pumps. Because of the wide variety of pumps available from each contractor, pumps have been listed by type rather than separately. Table 5 lists the pump type with a few manufacturer's names given for each. In general, centrifugal trash pumps are the most common and most widely used in oil spill cleanup with single and double diaphragm pumps also experiencing heavy use. Both are well suited due to their ability to pump heavy oils and pass limited amounts of debris. Even though centrifugal types have a high emulsification potential, this is a secondary consideration and does not affect the capacity of the pump. Other pumps are also well suited for oil spill cleanup but are not widely available. It should be noted, however, that rating pumps by type is not absolute as a few different models or manufacturers of the same pump type may have different capabilities than those listed in Table 6.

Table 3. BOOM CAPABILITIES

| Boom | Boom Type | Freeboard | Draft | Max. Wave Height | Max. Current Speed | Stability | Shallow Water Use |
|---|---|---|---|---|---|---|---|
| Metropolitan Petroleum | Curtain | 6 in. | 12 in. | 1-3 ft | 1 kt | Moderate | Good |
| Metropolitan Petroleum | Curtain | 12 in. | 24 in. | 5 ft | 1 kt | Moderate | Limited |
| Uniroyal Sealdboom | Fence | 6 in. | 12 in. | 1-2 ft | 1 kt | Poor | Poor |
| Coastal | Fence | 6 in. | 12 in. | 1-3 ft | 1 kt | Poor | Poor |
| Coastal | Fence | 12 in. | 24 in. | 1-3 ft | 1 kt | Poor | Poor |
| B.F. Goodrich | Fence | 12 in. | 24 in. | 3-5 ft | 1 kt | Good | Poor |
| Acme | Curtain | 6 in. | 12 in. | 1-3 ft | 1 kt | Moderate | Good |
| Slickbar MK-6 | Fence | 6 in. | 12 in. | 1-3 ft | 1 kt | Moderate | Poor |
| American Marine Optimax | Curtain | 7 in. | 12 in. | 1-3 ft | 1.5 kt | Good | Good |
| Kepner Supercompactible Sea Curtain | Curtain | 8 in. | 12 in. | 1-3 ft | 1 kt | Moderate | Good |
| Kepner Supercompactible Sea Curtain | Curtain | 12 in. | 18 in. | 1-3 ft | 1 kt | Moderate | Limited |
| Sea Sentry | Curtain | 12 in. | 24 in. | 1-3 ft | 1 kt | Good | Limited |

Table 4. SKIMMER CAPABILITIES

| Skimmer | Portable or Vessel Mounted | Effectiveness vs. Oil Type Light | Medium | Heavy | Solid | Max. Wave Height | Skimming Speeds[2] | Required Water Depth |
|---|---|---|---|---|---|---|---|---|
| JBF 3003 | V.M. | High | Moderate to High | Low | Low | 2-3 ft | 0-3 kts | 6 ft |
| JBF 3001 | V.M. | High | Moderate to High | Low | Low | 2-3 ft | 0-3 kts | 4 ft |
| Bennett Mk 6E | V.M. | High | Moderate | Low | Low | 2-3 ft | 1-2 kts | 6 ft |
| Oela "Swiss" | P | Moderate to High | Moderate | Low | Not Effective | 6" | NA | 8" |
| Slurp | P | Low | Moderate | Moderate | Not Effective | 1 ft | NA | 1 ft |
| Oil Hawg | P | Low | Moderate | Moderate to High | Not Effective | 6" | NA | 6" |
| Oil Mop | P | High | High | [1]Low to Moderate | Not Effective | 6" | NA | 6" |
| Manta Ray | P | Low | Moderate | Low | Not Effective | 6" | NA | 6" |
| Acme | P | Low | Moderate | Low | Not Effective | 6" | NA | 1 ft |
| Coastal Barge Skimmer | V.M. | Moderate | Moderate | Low | Not Effective | 1 ft | 1-2 kts | 3 ft |
| ______ I-D | V.M. | Moderate | Moderate to High | High | High | 2 ft<br>2-3 ft | 0-2 kts<br>1-4 kts | 3 ft<br>3 ft |
| LPI | V.M. | Moderate | High | High | Not Effective | | | |
| Skim Pak | P | Moderate | Moderate | Low | Not Effective | 6" | NA | 6" |

[1]Effectiveness improved with preheater.
[2]For vessel mounted types only.

## Table 5 -- Pump Capabilities

| Pump Type | High Viscosity Oils | Small Debris (< ¼") | Moderate Debris (¼-½") | Ice (Small Pieces | Emulsification Potential | Disadvantages |
|---|---|---|---|---|---|---|
| Centrifugal (Monarch, Hale) | Poor | Good | Good | Good | High | Most standard types cannot handle highly viscous oils at all. |
| Centrifugal--Trash (Homelite, Gorman-Rupp) | Moderate to Good | Good to Excellent | Good to Excellent | Good to Excellent | High | Typically, the higher the debris handling ability of the pump the lower the high viscosity pumping and self-priming ability. |
| Single Diaphragm (Homelite, Gorman-Rupp) | Good to Excellent | Good* | Moderate* to Good | Good* | Low | High degree of surging from diaphragm action--not applicable for skimmers requiring even suction (Slurp). |
| Double Diaphragm (Wilden, Sandpiper) | Good to Excellent | Good* | Moderate* to Good | Good* | Low | Slight surging--Many diaphragm pumps are pneumatic requiring a compressor--Diaphragms are susceptible to puncture by debris. |
| Sliding Shoe (Megator) | Good | Good to Excellent | Good | Good | Moderate | Pump should be operated against a total head of at least 10 ft to seat shoes and maximize efficiency. |
| Progressive Cavity (Moyno) | Excellent | Good to Excellent** | Good to Excellent** | Good to Excellent | Low | Not designed for mobile field use, may be fixed to deck of barge. |
| Sliding Vane (Blackmere) | Moderate to Good | Poor | Poor | Poor | Moderate | Cannot tolerate any debris and is ill suited for cold weather. |
| Rotary Gear (Rotoking) | Good | Poor | Poor | Moderate | High | Can crush small pieces of ice but intolerable to most solid debris. |
| Hydrodynamic (Spate) | Excellent | Good | Moderate to Good | Good | Moderate | Cannot handle long pieces of debris, i.e., twigs, pencils. |

*Some diaphragm pumps claim to handle debris up to 2".

**Depending on model.

Part II - Publicly Owned Oil Spill Containment and Clean-Up Equipment

Nassau County Police Department

1-42' patrol boat
3-32' patrol boats (on duty 24 hrs from April to January; one (1) boat on duty from January to April)
2-27' patrol boats (3 are generally on the North Shore; 3 are on the South Shore)

Nassau County Department of Health

1-23' Mako
2-16' Boston Whalers

Town of Oyster Bay

1-30' Columbia OBH
1-20' Boston Whaler
1-16' Boston Whaler
1-20' Garvey
1-35' Amphibious Landing Craft w/500 gal. container
1-12' Dinghy

Town of Hempstead

1 Ford Van
1 Diesel Scout 4 x 4
1 3500 lb trailer containing 1000ft of containment boom, sorbent sweeps and pads and sorbent boom, and related equipment
6 Various sized vessels for boom deployment

Material Stockpile:

500 ft M-P boom
100 boxes of sorbent pads
200' sorbent boom
400' sorbent sweeps

Town of North Hempstead

1-31' Bertram (with a 150 gpm water pump)
1-18' Boston Whaler
2-300' of Slickbar boom

Suffolk County Police Department

2-37' Egg Harbors
1-31' Chris Craft
4-30' Columbias
2-20' Shamrocks
1-22' Aquasport
1-19' Revenge
3-16' Challengers
3-16' Boston Whalers
1-15' Airgator
3-16' Grummans
1-14' Wolverine

Town of Brookhaven

1-32' Uniflite
2-20' Sealarks
1-19' Garvey
2-19' Shamrocks

Town of Babylon

1-30' Silverton (no winter service)
1-22' Airslot I/O

Town of Huntington

2-23' Patrol Boats
1-26' Work Boat
1-12' Shiff
1 4 x 4 GMC Pick-up
1 6 Wheel Drive Truck and Trailer

Material Stockpile:

300' absorbent sweeps
500 absorbent pads
50' absorbent collars

Town of Islip

In process of equipment inventory

Town of Southampton

1-36' Amphibious Lark
1-30' Dongan III
1-26' Dongan I
1-M/2 Dongan II
1-20' Pro-line (outboard)
1-17' McKee Craft (outboard)
1-16' Bayrunner
1-14' Hampton Whaler
1-14' Garvey
1-14' Grumman
1-14' Duranautic

1-24'x10' Work Barge with Hydraulic Winch

Fire Island National Seashore

Vehicles

3 4 x 4 Cherokee Jeeps
3 4 x 4 Chevy Subarbans
1 4 x 4 Dodge Rack Truck
1 4 x 4 Dodge Club Cab
1 4 x 4 Chevy Pick-Up

## Boats

1-32' FINS III Inboard Diesel
1-30' FINS II Inboard Diesel
1-27' FINS IV Inboard Diesel
1-27' Boston Whaler Outrage
3-22' Boston Whalers Revenge
1-21' Stiger Outboard

## U.S. Coast Guard, Marine Environmental Protection (MEP) Equipment in New York Area

*indicates equipment available for use in shallow water

### Group Rockaway

| | | |
|---|---|---|
| | 1,000 ft | Oil containment boom |
| * | 540' | Sorbent boom (3M type) |
| * | 6 bales | 3M sorbent pads |
| | 1 bag | Sorbent pads |

### Station Rockaway

| | | |
|---|---|---|
| * | 400 ft | Sorbent boom |
| * | 8 bales | 3M sorbent pads |
| | 1 | 44' boat with radar |
| | 2 | 41' boats with radar |
| * | 1 | 21' boat with outboard |

### Station Short Beach

| | | |
|---|---|---|
| * | 400 ft | Oil containment boom (12") |
| * | 8 bales | 3M sorbent pads |
| | 1 | 44' boat with radar |
| | 1 | 41' boat with radar |
| * | 1 | 21' boat (stored Nov.-Feb. in shed) |
| * | 1 | 17' boat (stored Nov.-Feb. in shed) |

### Station Fire Island

| | | |
|---|---|---|
| * | 100 ft | Sorbent boom (3M) |
| | 6 bales | 3M sorbent pads |
| | 1 | 44' boat with radar (year-round) |
| | 1 | 41' boat with radar (year-round) |
| * | 1 | 21' boat (no winter use) |
| * | 1 | 20' boat (no winter use) |

### Group New York

| | | |
|---|---|---|
| * | 300 ft | Slickbar harbor boom |
| * | 14 bales | 3M sorbent pads |
| * | 23 bales | Sorbent Sweep (100'/bale) |
| * | 4 bags | Oil Snare sorbent |
| * | 1 | Slurp skimmer |

2 41' boats with radar
5 32' boats without radar
1 30' boat
4 Response vehicles (suburban vans)
1 Command Post (16' trailer)
1 Boom trailer

U.S. Coast Guard Atlantic Strike Team (Elizabeth, NC)

Booms

5,508 ft USCG open water(high seas) boom
*1,000 ft Whittaker harbor boom
*1,000 ft Spilldam harbor boom

Skimmers

1 Lockheed 2004 disc drum skimmer (self-propelled) 1000 gpm
*1 Lockheed disc drum skimmer 50 gpm
*1 Slurp skimmer

Boats

1 22' Boston whaler (v-hull) two 85 hp
1 21' Boston whaler (Tri-hull) two 85 hp
*5 Zodiac boats 35 hp
*3 18' assault boats 25 hp

Other

5 ADAPTS type 1 Emergency Tanker Lightering Systems
1 250,000 gal Dracone barge
2 50,000 gal Dracone barge
1 10,000 gal Dracone barge

Communication Systems

USCG systems - commercial equipment may not be able to interphase easily

Long Island State Parks and Recreation Commission

2-18' Boston Whalers
1 Work Barge with Crane

New York State Department of Transportation

sorbent material stored at Hauppauge
500' Oil Containment Boom - Harbor Type
50' Light Emergency Containment Boom
160' Light Absorbent Boom
4 bales absorbent sheets
2 bales absorbent rolls

Part III - Spill Equipment Owned by Long Island Terminal Association Members

Carbo-Concord - Contact: Arnold Seltzer/James Grimaldi

(516) 293-2500

400' Optimax boom
12 Bundles 3M sorbent pads, booms and sweeps
1 Pump with 200' suction hose

Commander Oil Co. Inc. - Contact: Joseph G. Shapiro/Leonard Shapiro/ E.J. Barnett

(516) 922-7000
Emergency No. (516) 676-9393/(516) 922-7694

1 13' Boat on trailer/25HP motor
700' Containment boom
100-50 lbs. of absorbant
4 bales (400') Sorbent sweeps (T126)
2 1/2 bales (100') Sorbent booms (T270)
6 1/2 bales(1300') Sorbent sheets (T151)
10 bales 3M Sorbent pads

Glenhead Terminal Corp./Harbor Fuel Co., Inc. - Contact: Donald Death, Jr.

(516) 676-2500
Emergency No. (516) 676-0618

600' Slickbar boom
4 bundles Sorbent pads
1 bundle Sorbent boom
24 bags Oil Absorbent
25-50 40lb. bags Speedi-Dri absorbent

Hawkins Cove Oil Supply Co. - Contact: Bruce Hawkins

(516) 676-7200/759-0227

150' Harbor boom
4 cases Sorbent pads
4 bags Sorbent pellets
10 bags Oil Dry

Reliance Utilities - Contact: Lawrence F. Caputo

(516) 931-6800

Unspecified quantity of Speedi-Dri, Sorbent Pads and Chemical Dispersant.

Lewis - Contact: P. Miglietta

(516) 883-1000/767-2434

800' Boom
20 bags Sorbent pellets
2 bails 3M Sorbent pads
2 boxes Metro Sorbent pads
1 16' Utility Boat 15 HP

Northville Industries Corp.

Riverhead Terminal - Contact: Capt. John Dudley/Zenon Czujko

(516) 727-5600

1 Aluminum Skiff 25 HP
1 Parker Systems Skimmer Mod. 100; Ser. 88 with accessories
1 Floating Power Skimmer with associated equipment
750'x12" Floatation, Oil containment boom
300'x12" Containment boom
1200'x6' Containment boom
100'x8" Sorbent filtering boom
1 Edson Diaphragm pump

In addition the Riverhead terminal has an assortment of Sorbent materials and oil spill response support equipment such as hoses; floats and coils of polyprophylene line.

Plainview Terminal - Contact: Pete Miloski

(516) 349-8071/727-7286

1 Scavenger Pump
30 bags Speedi-Dri

Holtsville Terminal - Contact: Jeff Burns

(516) 475-5060/727-6378

1 Portable pump
60 bags Speedi-Dri

Consolidated Petroleum Terminal (Pt. Jefferson Dock) - Contact: Mr.Vandermark

(516) 941-4040
Emergency No. John Reiff/Walter Remsky (516) 941-4040

1 12' Fiberglass Skimmer Boat 2 HP
1,600' MPL Harbor Oil spill boom
3,000' 3M Sorbent sweep
20 boxes Sorbent pads
6 boxes Sorbent pillows

6 cases Type 300 Oil snare
150' Sorbent blanket
1 Edson pump
1 Lister pump with assorted hoses and equipment

Skaggs-Walsh Inc. - Contact: Peter F. Heaney

(212) 353-7000
Emergency No. Tony Sabatino (516) 389-7247
Bill Michnowitz (516) 352-2571

1 Row boat w/oars
2000 lbs. Sorbent material
55 gals Dispersant
300' Boom
1 Skimmer
200 Sorbent pads

Windsor Fuel Oil Inc. - Contact: D. Leoguande

(516) 746-5900

150' Boom
7 boxes 3M Sorbent pads
1 10' Row Boat
10 Bales Hay

Universal Utilities Inc. - Contact: Joseph Shapiro

(516) 922-7000
Emergency No. E.J. Barnett (516) 922-7694

2 bales (200') Sorbent sweeps (T126)
2 bales (80') Sorbent booms (T270)
3 1/2 bales (750') Sorbent sheets (T151)
600' Containment boom

## Part IV Spill Equipment Owned by Private Companies

A. OIL CITY PETROLEUM COOPERATIVE (includes B.P. Oil, CIBRO, EXXON, GULF, SUN OIL and LILCO)

Location - Gulf Oil Company Terminal Garage
Contact - Mr. Ray Storwick (516) 432-3900

List of Equipment:

| | |
|---|---|
| 1 | Utility Trailer |
| 1 | Skimmer |
| 1 | Gasoline powered pump |
| 50 | Bags absorbent |
| 200' | Metropolitan boom |

B. LILCO

Location - E. S. Barrett, Power Station
Contact - Mr. Dittmeier, Chief Engineer (516) 432-1400

1. South End of Storeroom

a. 40 bags fiber-pearl absorbent
b. 5 - 100' sections of booms with connectors
c. 48 oil absorbent pillows
d. 3 boxes of oil filtering boom
e. 4 - 100' oil absorbent sweeps
f. 1 gas-engine powered skimmer with hose
g. Boston Whaler on dolly with motor

2. At Dock

a. 600' containment boom for off-loading

3. Adjacent to Plant

a. 350 gal. tank for use with skimmer

C. B.P. OIL CORP.

Location - 3631 Hampton Road, Oceanside, New York
Contact - Mr. L. Parisi (201) 748-6724 or
Mr. P. Becker (516) 489-9261

List of Equipment

| | |
|---|---|
| 25 | Bags absorbent C |
| | Supply of absorbent pads |
| 15 | Cans No Lite |
| 500' | Boom (in water) |
| | Foam cans |

D. CIBRO TERMINAL

Location - 7 Washington Ave., Island Park, New York
Contact - Mr. Ray Storwick (516) 667-2854 or Mr. M. Marasco (516) 431-7305

List of Equipment

150 Cans powder foam
150' New Boom - packaged
25 Bags absorbent C
Supply of absorbent pads
Rack truck with lift gate
800' Boom in water

E. EXXON CO., U.S.A.

Location - Hampton Road, Oceanside, New York
Contact - Mr. J. Colligan (516) 742-3623 or
Mr. O. Runge (516) 842-1980

List of Equipment

Sorbent C 54 bags 18 CBS
Liquid foam 100 5 gal. cans XL-3 NFSI
Oil Spill Pillows 2-40 lb. boxes
80 ft. Oil Absorbent Boom - 8' x 10' sections

F. GULF OIL COMPANY

Location - Hampton Road, Oceanside, New York
Contact - Mr. S. Beanland (516) 661-6136 or
Mr. Darow Forbes (516) 764-3487

List of Equipment

1000 ft. of MP Boom in water
15' Boston Whaler with 35 HP motor in water
50 Bags of Sorbent
275 Gallons of 3% liquid foam in five gallon cans
Assorted rakes and shovels

G. SUN OIL COMPANY

Location - Hampton Road, Oceanside, New York
Contact - Mr. P. Caldwell (516) 654-3671 or
Mr. J. Vitowski (516) 587-3455

List of Equipment

1000' Metropolitan Boom in water
50 bags of sorbent
900 Gallons - 3% protein foam in tank ready for use
11-55 Gallon drums XL3
22- 5 Gallon cans of national foam

## APPENDIX C

### Oily Waste Disposal

The disposal of recovered oil and of oil-contaminated materials can pose immediate and long-range problems. Recovered oil is most easily dealt with by separating out any water that may be present and refining it locally or shipping it to its original destination.

Disposal of contaminated debris is more difficult. Legal requirements for its disposal are established by the New Jersey Department of Environmental Protection for New Jersey and the New York Department of Environmental Conservation or the New York City Department of Sanitation for the New York area. In most cases, contaminated wastes should not be burned. They can be buried safely on land in approved disposal sites if correct procedures are followed. It is often advisable during waste handling, transfer, or storage to cover the area of operation with plastic sheets to prevent contamination.

Disposal can pose several problems. The first is storage and transport of oil and contaminated material to the disposal sites. Remote locations and areas sensitive to vehicular traffic impose limits on access. Helicopters or boats may be necessary to remove pillow tanks and other small storage containers. In the case of a large spill or extended containment or cleanup activities, an access road should be constructed to permit the use of heavy equipment to transport material from the recovery area to the disposal site.

The second problem involves the several available disposal methods. They include oil and water separation, burial, and natural degradation. The specific disposal method selected depends on the nature of the oil-contaminated material, the location of the spill, and the prevailing weather conditions.

Disposal of Recovered Oil

In most spill situations the oil recovered will contain a large percentage of water which should be separated out prior to disposal or recycling. In the event of a major spill, a large-scale oil/water separation operation should be set up at a local refinery, processing plant, or other facility possessing separation equipment. Many authorized waste oil and chemical processing facilities exist throughout New York and New Jersey but are oriented to chemicals and may be limited as to the quantity of material they can handle. Table 1 lists these facilities. A list of the regional liquid waste oil collectors is given in Table 2.

Disposal of Oiled Material

Oil spills can generate large quantities of oil-contaminated material consisting primarily of debris, vegetation, sediments, and sorbenst. Disposal of such debris is a major problem as only a few sites are authorized to receive oily wastes. The disposal regulations for New York and New Jersey are discussed below.

New York. In the State of New York there are presently no predesignated sites approved by the Department of Environmental Conservation (DEC) for disposal of oily wastes. In the event of a spill the DEC will consider requests for disposal on a case-by-case basis. Most landfill operations on Long Island are hesitant to accept oily wastes unless directed to do so by the DEC. There are three lined landfills on Long Island at Brookhaven, Oyster Bay and North Hempstead, which may take oily wastes. The NY DEC would like local communities to accept oily sand and debris collected from their own areas. A form letter sent by the NY DEC to local landfills would request their assistance. The form letter would describe the waste, state its volume, name the waste carrier and state there is no contamination (e.g., heavy metals, PCB's, etc.) in the oil. If contamination is suspected the

Table 1. AUTHORIZED CHEMICAL WASTE PROCESSING FACILITIES* (DISPOSAL/RECYCLING OF LIQUID WASTES)

| Facility | Type of Treatment | Type of Waste Accepted |
|---|---|---|
| New Jersey | | |
| Advanced Environmental Technology Corp.<br>The Dayton Bldg.<br>520 Speedwell Ave.<br>Morris Plains, NJ 07950<br>(210) 539-7111 | Transfer, Storage | Packed laboratory chemicals, vegetable oils, motor oils, compressor oils, laboratory chemicals, solvents, pesticides, silver, platinum, gold, copper salts, acids, alkalis, dyes, pigments, solution |
| AntiPollution Systems, Inc.<br>350B W. Delilah Rd.<br>Pleasantville, NJ 08232<br>(609) 641-1119 | Incineration | Waste oils, emulsion, water-methanol waste, pigments, dyes |
| B & L Oil Corp.<br>472 Frelinghuysen Ave.<br>Newark, NJ 07114<br>(201) 248-7925 | Reprocesser | Crankcase oil, fuel oil, hydraulic oil |
| Browning Ferris Industries<br>714 Division St.<br>Elizabeth, NJ 07207<br>(201) 352-2222 | Transfer, Storage | Flammable solids, paint, pigment, ink sludge, oil, solvent, slurries, flammable liquids, non-flammable liquids |
| Clark Systems<br>Formerly Blackwood Carbon Products<br>Little Gloucester Rd.<br>Blackwood, NJ<br>(906) 589-7301 | Oil Recovery | Oil and oil emulsions |
| Duane Marine<br>26 Washington St.<br>Perth Amboy, N.J.<br>(201) 925-6010 | Oil/water separation and reprocessing. Storage facility. | Oil and oil emulsions. |
| Earthline Co.<br>100 Lister Ave.<br>Newark, NJ 07105<br>(201) 465-9100 | Organic reclamation, from contaminated aqueous waste, acid/base neutralization, hazardous waste detoxification (oxidation reduction), fuel reclamation | Organic, aqueous wastes, solvents, chlorinated solvents, oily wastes, acids, alkalis, cyanides, mixed heavy metal waste, waste fuel and lubricating oils |

Table 1. Continued

| Facility | Type of Treatment | Type of Waste Accepted |
|---|---|---|
| Eastcoast Pollution Control, Inc.<br>Cenco Blvd., P.O. Box 275<br>Clayton, NJ 08312<br>(906) 881-5100 | Transfer, Storage | Cleanup debris, waste oil, mixed solvents, still bottoms |
| Elco Solvent Corp.<br>30 Amor Avenue<br>Carlstadt, NJ 07072<br>(601) 460-4000 | Transfer, Storage | Flammable, non-flammable liquids, solvents |
| Inland Chemical Corp.<br>600 Doremus Ave.<br>Newark, NJ<br>(201) 589-4085 | Reclamation, Recovery | Solvents, organic liquids, aqueous-organic emulsions, lacquer, paint, pigment residues |
| Kit Enterprises Inc.<br>475 Division St.<br>Elizabeth, NJ 07201<br>(201) 574-8804 | Reclamation, Recovery, Blending, Treatment | Oil lubricants, fats and fatty oils, heavy and light hydrocarbons |
| L & L Oil Service Inc.<br>740 Lloyd Rd.<br>Aberdeen, NJ 07747<br>(201) 566-2785 | Transfer, Storage, Reprocesser, Blending | Waste oil and oil sludge |
| Lionetti Waste Oil Service Inc.<br>9 Line Rd.<br>Holmdel, NJ 07733<br>(201) 946-2505 | Storage, Blending | Motor oils, fuel oils, hydraulic oils |
| Marisol Incorporated<br>125 Factory Lane<br>Middlesex, NJ 08846<br>(201) 469-5100 | Transfer, Storage, Reprocesser, Reclamation, Recovery, Blending, Treatment | Oils, emulsions, solvents, flammable organic liquids, non-flammable liquids, paint, pigment residues, flammable liquids |
| Modern Transportation<br>75 Jacobus Ave.<br>Kearny, NJ 07032<br>(201) 589-0277 | Transfer, Storage, Reclamation, Recovery, Treatment, Disposal | Oils, emulsions, acid, alkali solutions, wastewaters, acids alkalis |

## Table 1. Continued

| Facility | Type of Treatment | Type of Waste Accepted |
|---|---|---|
| Oil Recovery Co. Inc<br>Cenco Blvd.<br>P.O. Box 345<br>Clayton, NJ 08312<br>(609) 881-7400 | Storage, Reprocesser, Reclamation, Recovery, Blending | Waste oil, solvents, oil sludge |
| Rollins Environmental Services<br>P.O. Box 221<br>Bridgeport, NJ 08014<br>(609) 467-3100 | Incineration, Neutralization, Chemical Treatment, Recovery, Reclamation, Transfer, Storage | Sludges, contaminated residues, spill debris, process wastewater, slurries, tank cleanings, solvents |
| S & W Waste, Inc.<br>25 Delmar Rd.<br>Jersey City, NJ<br>(201) 344-4004 | Transfer, Storage | Paint, dyes, pigment residues, heavy metal residues, flammable solids, oils, emulsions, flammable liquids, acids, alkalis, solvents |
| Safety-Kleen Corp.<br>Almo Industrial Park<br>Clayton, NJ 08312<br>(609) 881-2526 | Reclamation, Recovery | Oil, oil emulsions, oil sludges, mixed solvents |
| Standard Tank Cleaning Co.<br>184 Hobart Avenue<br>Bayonne, NJ 07002<br>(201) 339-5222 | Recovery, Storage | Oils, emulsions, organic sludges, non-flammable liquids, flammable liquids |
| <u>New York</u> | | |
| Chemical Waste Disposal Corp.<br>42-19 19th Ave.<br>Astoria, NY<br>(212) 274-3339 | Processing/Treatment<br>Recycling/Reclamation<br>Distillation for oil recovery | Sludges, paint, oil, lab chemicals, plating waste, chlorinated solvents |
| Frontier Chemical Waste Process, Inc.<br>4626 Royal Avenue<br>Niagara Falls, NY 14303<br>(716) 285-8200 | Processing/Treatment<br>Recycling/Reclamation | Waste oil/industrial waste, reusable chemicals, nonchlorinated oil, burnable liquid wastes, recovered methanol, recovered oil, chlorinated solvents |
| Haz-O-Waste Corp.<br>Canal Road<br>Wampsville, NY<br>(315) 682-2160 | Processing/Treatment<br>Recycling/Reclamation<br>Distillation | Solvents, waste oil, burnable, liquid wastes, acids, alkalis, sludges |

Table 1. Concluded

| Facility | Type of Treatment | Type of Waste Accepted |
|---|---|---|
| NEWCO Chemical Waste Systems, Inc.<br>4626 Royal Ave.<br>Niagara Falls, NY 14303<br>(716) 278-1811 | Processing/Treatment<br>Recycling/Reclamation | Hazardous/toxic wastes and most every other waste stream except radioactive and shock-sensitive explosives |
| SCA Chemical Waste Services, Inc.<br>1550 Balmer Rd.<br>Model City, NY 14107<br>(716) 754-8231 | Processing/Treatment<br>Recycling/Reclamation<br>Secure landfill | Solvents, acid, heavy metal sludge, paint wastes, PCB solids and sludges, contaminated soil, organic liquids |

Sources: New Jersey Department of Environmental Protection and New York Department of Environmental Conservation

*Check authorization status with the New York D.E.C. (212) 488-3862 or the New Jersey D.E.P. (609) 292-5560 prior to use.

Table 2. APPROVED WASTE OIL COLLECTORS (LIQUID HAULING)

| Name and Address of Firm | No. of Trucks |
|---|---|
| **New York** | |
| Ace Waste Oil, 71-34 58th Avenue, Maspeth, NY 11378 | |
| Akba Waste Oil, 3836 Hahn Ave., Bethpage, NY 11714 | |
| A-Z Waste Service, Inc. 60 Harmon St., Falconer, NY 14733 | 9 |
| Albany Waste Oil Corp., RD #2, Clifton Park, NY 12065 | 2 |
| Alboro Construction Co., 90-48 Corona Ave., Elmhurst NY 13209 | 1 |
| Allied Chemical Corp., P.O. Box 6, Milton Ave., Solvay, NY 13209 | 6 |
| Allied Waste Corp., 88-13 204 St., Hollis, NY 11423 | 3 |
| American Chemical Disposal Corp., Oser Ave., Hauppauge, NY 11778 | |
| Buckner Waste Oil Service, 21 Stonecrest Dr., New Windsor, NY 12550 | 1 |
| Certified Waste Oil, 320 Court House Rd., Franklin Square, NY 11010 | |
| C & F Pollution Control, Inc., 3266 Taylor St., Schenectady, NY 12306 | 4 |
| Chamberlain's Septic Service, 1835 Route 104, Union Hill, NY 14563 | 6 |
| Chemical Management, Inc., 340 Eastern Parkway, Farmingdale, NY 11735 | |
| Chemical Waste Disposal Corp., 42-14 19th Avenue, Astoria, NY 11105 | 2 |
| C.H. Heist Corp., 505 Fillmore St., Tonawanda, NY 14150 | 5 |
| Coastal Pollution Control Services, Inc., P.O. Box 140, Renesselaer, NY 12144 | 4 |
| Cortlandt's Septic Tank Service, Inc., P.O. Box 351, 22 Albany Post Rd., Mentrose, NY 10548 | 6 |

Table 2. Continued

| Name and Address of Firm | No. of Trucks |
|---|---|
| County Tank Lines, Inc., Rte. 58 - E. Main Street, Riverhead, NY 11901 | |
| County Waste Oil, Inc., 57 Brown Place, Harrison, NY 10528 | 3 |
| Domermuth Petroleum Equipment and Maintenance Corp., Box 62, Clarksville, NY 12041 | 6 |
| Duane Marine Corp., P.O. Box 435, Staten Island, NY 10308 | |
| East Coast Tank Lining Corp., 700 Hicks St., Brooklyn NY 11231 | 3 |
| Elmwood Tank Cleaning Corp., 62 West Market St., Buffalo, NY 14204 | 5 |
| Environmental Oil, Inc., P.O. Box 315, Syracuse, NY 13209 | 5 |
| E.W. Wllsworth and Sons Sanitation Service, 219 Mitchell Ave., Mattydale, NY 13211 | 2 |
| Fourth Coast Pollution Control, La Grasse St., Waddington, NY 13694 | 3 |
| Frank Masone, Inc., 368 Ocean Ave., Lynbrook, NY 11563 | 4 |
| Frank's Bay City Oil Service, 1117 Olympia Rd., No. Bellmore, NY 11710 | |
| Frontier Chemical Waste, 4626 Royal Avenue, Niagra Falls, NY 14303 | 3 |
| General Electric Co., P.O. Box 8, Room 2C13 K-1, Schenectady, NY 12301 | 1 |
| General Waste Oil Co., 37 Longworth Ave., Dix Hills NY 11746 | |
| Harrison Radiator Div. GMC, Upper Mountain Rd., Lockport, NY 14094 | 3 |
| Industrial Oil Tank and Line Cleaning Service Co., 307 East Garden St., Rome, NY 13440 | 4 |
| Inland Pollution Control Inc., P.O. Box 357, 63 Columbia St., Rensselaer, NY 12144 | 2 |

Table 2. Continued

| Name and Address of Firm | No. of Trucks |
|---|---|
| J.B. Waste Oil Co., 18-18 41st St., Long Island City, NY 11105 | |
| James Parks, 2734 Chestnut St., York, NY 14592 | 1 |
| Janic Waste Oil Corp., Bay Street, Freeport, NY 11520 | |
| J.K. Waste Oil Service, 280 Grank Blvd., Deer Park, NY 11729 | 2 |
| J.W. Lenza Oil Company, 3 Court St., Staten Island, NY 10304 | 1 |
| Kroll Associates, 19 Woodgate Rd., Tonawanda, NY 14150 | RENTAL |
| Loeffel's Oil Service, RD #2, Narrowburg, NY 12764 | 3 |
| Lomasney Combustion, Inc., 366 Mill St., Poughkeepsie, NY 12602 | 2 |
| Long's Landscaping, 2106 Love Rd., Grand Island, NY 14072 | 1 |
| Luzon Oil Company, P.O. Box 19, Hurleyville, NY 12747 | 2 |
| Manhattan Oil Service, 21-11A 46th St., Astoria, NY 11105 | 1 |
| Marine Pollution Control, Inc., 460 Terryville Rd., Port Jefferson Station, NY 11776 | 4 |
| New Era Oil Service, Inc., 402 Parsons Drive, Syracuse, NY 13219 | 5 |
| Niagra Mohawk Power Corp., 300 Erie Blvd., West Syracuse, NY 13202 | 2 |
| Niagra Tank and Pump Co., 262 Carlton St., Buffalo, NY 14204 | 1 |
| Oceanside Equipment Rental Corp., 70 New St., Oceanside, NY 11572 | 3 |
| Oldover Corp., P.O. Box 2, Saugertiers, NY 12477 | 1 |
| Patterson Chemical Co. Inc., 102 Third St., Brooklyn, NY 11231 | |
| RGM Liquid Waste Removal, 972 Nicols Rd., Deer Park, NY 11729 | |

Table 2. Continued

| Name and Address of Firm | No. of Trucks |
|---|---|
| Rice Tank Cleaning Corp., 434 Suffolk Ave., Box 296, Central Islip, NY 11722 | 7 |
| Wm. F. Sheridan, Jr. Industrial Oil Corp., 114 Peconic Ave., Medford, NY 11763 | |
| Southgate Oil Services, Inc., P.O. Box A, 2699 Transit Rd., Elma, NY 14059 | 9 |
| Stage Construction Co., Inc., 105 Commercial Ave., Vestal, NY 13850 | 2 |
| Strebel's Laundry, 644 Montauk Highway, Westhampton, NY | |
| Superior Pipecleaning, Inc., 168 Woodlawn Ave., Woodlawn, NY 14219 | 5 |
| Swanson Chemical Laboratories, Inc., 4 West First St., Lakewood, NY 14750 | 1 |
| Timber Lake Campground, Plato Maples Rd., RFD #1, Box 72, E St., Otto, NY 14729 | 1 |
| United Pump and Tank of Rochester, Inc., 779 Arnett Blvd., Rochester, NY 14619 | 1 |
| Verdi Construction, Route 31, Savannah, NY 13146 | 6 |
| Wizard Method, Inc., 1100 Connecting Rd., Niagra Falls, NY 14304 | 14 |
| W.L. Oil Co., Inc., 178 North Elting Corners Rd., Highland, NY 12528 | 2 |
| W.M. Spiegel Sons, Inc., 461 E. Clinton St., Elmira, NY 14902 | 7 |
| World Wide Pollution Control, Inc., P.O. Box 702 New Station, New Paltz, NY 12561 | 3 |
| <u>New Jersey</u> | |
| A.M. Environmental Services, Inc., 1031 Market St., Paterson, NJ 07513 | 7 |
| Angus Tank Cleaning Corp., One Ingham Ave., Bayonne, NJ 07002 | 6 |

Table 2. Continued

| Name and Address of Firm | No. of Trucks |
|---|---|
| Clean Venture, Inc., P.O. Box 418, Foot of South Wood Ave., Linden, NJ 07036 | 1 |
| Depalma Oil Co., 21 Myrtle Ave., Jersey City, NJ 07305 | 4 |
| Eastcoast Pollution Control, Inc., Cenco Blvd., Clayton, NY 08312 | 12 |
| Energall, Inc., 411 Wilson Ave., Newark, NJ 07105 | 18 |
| Essential Trucking Corp., Fanny Rd., Boonton, NJ 07005 | 3 |
| Kisko Transportation Co., Inc., 504 Raritan St., Sayerville, NJ 08872 | 1 |
| Loeffel's Waste Oil Service, Inc., P.O. Box 651, Old Bridge, NJ 08857 | 3 |
| Marisol, Inc., 125 Factory Lane, Middlesex, NJ 08846 | 4 |
| Nalco Chemical Co., 1927 Nolte Drive, Paulsboro, NJ 08066 | 1 |
| Ned's Waste Oil Service, P.O. Box 375, Newton, NJ 07860 | 4 |
| Phil's Waste Oil, 13 Ronald Drive, E. Hanover, NJ 07936 | 1 |
| Robert More Waste Oil, 124 Baltimore St., North Arlington, NJ 07032 | 1 |
| SCA Chemical Services, Earthline Division, 100 Lister Ave., Newark, NJ 07105 | 47 |
| Solvents Recovery Service of New Jersey, Inc., 1200 Sylvan St., Linden, NJ 07036 | 2 |
| T/A Samson Tank Cleaning, 101 E. 21st St., Bayonne, NJ 07002 | 3 |
| <u>Other</u> | |
| Acme Services, Inc., 985 Plainfield St., Johnston, RI 02919 | 7 |
| Berks Associates, Inc., P.O. Box 305, Douglassville, PA 19518 | 4 |

Table 2. Concluded

| Name and Address of Firm | No. of Trucks |
|---|---|
| Colvin's Waste Oil Service, 24 Marrer St., Warren, PA 16365 | 1 |
| G & H Oil Co., 455 Hemlock Rd., Warren, PA 16365 | 1 |
| Hitchcock Industrial Liquid Waste, 40 California St., Bridgeport, CT 06608 | 5 |
| Jet Line Services, Inc., 441R Canton St., Stoughton, MA 02072 | 18 |
| New England Marine Contractors, Inc., 189 Lakeside Ave., Burlington, VT 05401 | 6 |
| New England Pollution Control Co., Inc., 7 Edgewater Pl, E. Norfolk, CT 06855 | 6 |
| Schofield Oil Ltd., P.O. Box 40, Breslau, Ontario, Canada NOB 1MO | 3 |
| Solvents Recovery Service of New England, Inc., Lazy Lane, Southington, CT 06489 | 6 |
| The Crago Co., Inc., Route 26, P.O. Box 409, Gray, ME 04039 | 3 |
| Tansenviroamental Corp., 500 Ford Blvd., Hamilton, OH 45011 | 1 |
| Tricil Limited, 602 Rte. 132, Ste. Catherine, Quebec, Canada | 1 |

NY DEC would analyze the contents. This plan is still in the fromative stages.

New York City. All requests for information relative to disposal of oil-contaminated solid wastes shall be channeled through the NYC Department of Sanitation, Operations Control Office, Bureau of Waste Disposal at the following numbers:

(212) 566-5326/5327

The following locations have been designated for receipt of oil-contaminated solid waste generated during and as a result of oil spill cleanup operations. Use of the following disposal facilities will be limited to those carriers possessing a "NYS DEC Industrial Waste Collector Certificat of Registration" (SW-3) and either a Department of Consumer Affairs Waste Conveyance License or a Department of Sanitation Construction Waste Permit. Disposal of materials will be from 0800 to 1600, Sundays and holidays excluded.

NYC Disposal Sites - Fountain Avenue Landfill
Fountain Ave. & Belt Parkway
Brooklyn, N.Y.

Edgemere Landfill
Beach 49th St. & Beach Channel Dr.
Rockaway, Queens, N.Y.

Brookfield Avenue Landfill
Arthur Kill Rd. & Brookfield Ave.
Staten Island, N.Y.

A list of qualified and approved regional oily solid waste carriers is given in Table 3.

If further information be required, Mr. Gus Fischetti, Engineer in Charge of Landfills, should be contacted, (212) 272-9811.

New Jersey. For disposal of oil-contaminated solid wastes within the State of New Jersey, contact the New Jersey Department of Environmental Protection for an approved dump site at (609) 292-5560. There are currently no

Table 3. APPROVED OILY WASTE CARRIERS (SOLID WASTE BUILDING)

| | |
|---|---|
| Active Oil Service, Inc.<br>374 Main Street<br>Belleville, NJ 07109<br>(201) 482-4600 | National Oil Recovery Corp.<br>Hook Road & Commerce Street<br>Bayonne, NJ 07002<br>(201) 437-7300 |
| Atlantic B.C., Inc.<br>145 Van Dyke Street<br>Brooklyn, NY 11231<br>(212) 522-3260 | Newtown Refinery Corp.<br>37-80 Review Avenue<br>Long Island City, NY 11101<br>(212) 729-7660 |
| Chemical Control Corp.<br>23 South Front Street<br>Elizabeth, NJ 07202<br>(201) 351-5460 | Oceanside Equipment Rental Corp.<br>70 New Street<br>Oceanside, NY 11572<br>(516) 678-4466 |
| Earth Line, Inc.<br>End of Wood Avenue<br>Linden, NJ 07036<br>(201) 862-4747 | Oil Tank Cleaning Corp.<br>107-127 27th Street<br>Brooklyn, NY 11232<br>(212) 499-9608 |
| East Coast Tank Lining Co.<br>700 Hicks Street<br>Brooklyn, NY 11231<br>(212) 855-7272 | Petroleum Tank Cleaners, Inc.<br>145 Huntington Street<br>Brooklyn, NY 11231<br>(212) 624-4842 |
| Guardino & Sons, Inc.<br>80 Broad Street<br>New York, NY 10004<br>(212) 943-6966 | Royal Tank Cleaning Corp.<br>687 S. Columbia Avenue<br>Mount Vernon, NY 10550<br>(914) 664-7070 |
| Mobil Oil Corp.<br>4165 Arthur Kill Road<br>Staten Island, NY 10307<br>(212) 948-5400 | Samson Tank Cleaning Corp.<br>101 East 21st Street<br>Bayonne, NJ 07002<br>(201) 437-1044 |
| Modern Transportation Co.<br>75 Jacobus Avenue<br>S. Kearney, NJ 07032<br>(201) 589-0277 | Standard Tank Cleaning Corp.<br>One Ingham Avenue<br>Bayonne, NY 07002<br>(201) 339-5222 |

approved dump sites in New Jersey. Approval for dumping oil-contaminated solid wastes is granted on a case-by-case basis.

All vehicles used in the collection or haulage of solid waste shall properly and conspicuously display the New Jersey Solid Waste Administration (NJSWA) registration number in letters and numbers at least 3 inches in height, and shall carry the current Solid Waste Administration registration certificate in the vehicle. In addition, in letters and numbers at least 3 inches in height, the capacity of the vehicle in cubic yards or in gallons, with the appropriate unit designated, shall be marked on both sides of the vehicle so as to be visible to the operator of the solid waste facility.

Further, all vehicles containing oil-contaminated waste shall be conspicuously placarded by the special waste hauler. Such placarding shall meet the requirements of the United States Department of Transportation for the transport of hazardous materials (49 CFR 170 et seq.).

No special waste facility shall accept oil-contaminated waste unless the vehicle is properly placarded in accordance with this section.

Temporary Waste Storage. If there are large quantities of materials for disposal, a temporary storage site should be established. A temporary storage site provides a location to store oily sediment and debris removed during shoreline cleanup operations until a final disposal site has been located, approved, and made operable. The temporary storage sites should be located in areas with good access to the shoreline cleanup operation and to nearby streets and highways. Good storage site locations are flat areas such as parking lots (paved or unpaved) or undeveloped lots adjacent to the shoreline.

Temporary storage sites should be selected and prepared to minimize contamination of surrounding areas from leaching oil. Therefore, storage sites should not be located on or adjacent to ravines, gullies, streams, or the sides of hills, but on flat areas with a minimum of slope. Once a location is selected, certain site preparations are usually necessary to contain any leaching oil. An earth berm should be constructed around the perimeter of the storage site. If a paved parking lot is used, earth would have to be imported from nearby areas; if an unpaved surface is used, material can be excavated from the site itself and pushed to the perimeter thereby forming a small basin. Entrance and exit ramps should be constructed over the berm to allow cleanup equipment access to the site. If the substrate or berm material is permeable, plastic liners should be spread over the berms and across the floor of the storage site in order to contain any possible oil leachate.

A front-end loader should be stationed at each storage site to evenly distribute the dumped oily material and to load trucks removing the material to final disposal.

# APPENDIX D

## Dispersants

### Introduction

Spills of crude oil and petroleum products in the marine environment can result in varying types and degrees of environmental damage. In some cases spills may even involve threat of fire and explosion. To reduce these threats, various specialized techniques and equipment have been developed and used with different degrees of success. In almost all cases, limitation of spread and physical recovery of the spilled material represent the most environmentally acceptable actions and should always be given first consideration. However, as a result of spill size, weather, and other factors, control and recovery are not always adequate or even possible. Other options to minimize impacts should be explored in these situations.

An alternative to conventional methods of containment and recovery is the use of chemical dispersants. Dependant on the oil characteristics dispersants can assist the breakup and mixing of oil slicks into the water column, accelerating dilution and degradation rates. In addition, they may be used in sea states where conventional techniques are no longer effective.

### Federal Regulation

The use of chemical dispersants is closely regulated by the federal government and can only be initiated in situations where it is deemed the most effective and least environmentally hazardous alternative. While advocating physical control and removal of spilled oil, the National Oil and

Hazardous Substances Pollution Contingency Plan provides the basis for case-by-case utilization of chemical dispersants and other treating agents. Known as Annex X, this schedule permits consideration of chemical dispersion in the following circumstances (40 CFR 1510, Annex X, Sections 2003.1-1 to 2003.1-1.3):

- In any case when, in the judgement of the federal On-Scene Coordinator (OSC), their use will prevent or substantially reduce hazard to human life or limb or substantially reduce explosion or fire hazard to property.
- For major or medium discharges when, in the judgement of the on-scene Environmental Protection Agency representative, their use will prevent or reduce substantial hazard to a major segment of the population(s) of vulnerable species of waterfowl.
- For major and medium discharges when, in the judgement of the Environmental Protection Agency response team member in consultation with appropriate state and federal agencies, their use will result in the least overall environmental damage, or interference with designated water uses.

Principals of Dispersion

Dispersion may be defined as the act or state of being broken apart and scattered. Oil floating on water will ultimately disperse naturally in response to currents and waves. As the degree of surface energy increases, the rate of natural dispersion increases. Typically, however, the natural process is slow and agitation of some oils often results in the formation of extremely persistent and difficult to treat water-in-oil emulsions (tar balls, mousse). For some oil types dispersants can greatly increase the rate of dispersion and prevent the formation of water-in-oil emulsions reducing the potential damage associated with floating slicks.

Dispersant formulations contain varying amounts of surface active agents (or surfactants). Technically, surfactants act to modify (reduce) the oil surface tension. Each surfactant molecule may be thought of as polar in nature, one end having an affinity for oil, and the other an affinity for water. When applied to floating oil, the surfactant diffuses through the oil and individual surfactant molecules orientate themselves along the surface with their water attracting ends out. (It is critical that the dispersant contact the oil and not be applied to the surrounding water.) As the slick is broken apart by natural or manmade energy, treated particles are separated and repelled, preventing slick reformation. Eventually, treated oil particles are broken into small enough drops that they remain suspended and dispersed in the water. Because the oil particles are surrounded by surfactant molecules, they tend not to adhere to solid objects such as boats, shorelines, etc. In dispersed form, the spilled oil has a much larger surface area which serves to accelerate solution, evaporation, photo-oxidation, and biodegradation rates.

Environmental Effects

The acceptance of chemical dispersants as a means of combatting oil spills has been deterred by real and inferred environmental damages associated with a few misapplications of early high toxicity products and a limited knowledge of the potential effects of the modern, low toxicity dispersant formulations.

However, there has been little evidence from actual field use of dispersants to prove or disprove significant effects resulting from the proper application of chemical agents. In contrast, the ecologic realities associated with spilled oil - particularly in coastal and shoreline areas - are dramatic and far better understood. When predictable damage or threats associated with untreated oil are compared with the known and unknown aspects of chemically treated oil, it may be possible to identify cases in which one action has significantly less total risk than another.

Toxicity data on government accepted dispersants are available from the EPA in the form of $LC_{50}$'s. Using the effective dosage rates, the potential concentrations of dispersants in the water column can be estimated and compared to their $LC_{50}$ values. The comparison can then be used to predict possible ecologic consequences.

Some laboratory and field evidence suggests that chemically produced oil dispersions may be more toxic than naturally produced dispersions. It has been hypothesized that this phenomenon is a synergism between oil and dispersant which produces more toxic end products. Certain toxic components in the oil are activated, and therefore, preferential release of other toxic components occurs. A dispersant can increase the rate at which volatile fractions of oil are available to enter the water column. It is generally believed, however, that the "increased toxicity" of a dispersion is more related to the increased availability of the oil to various marine organisms. By breaking the oil up into minute droplets, the dispersant enhances the uptake and incorporation of certain oil components by many marine organisms through their breathing and feeding mechanisms. For this reason, dispersed oil at a given concentration may have a more adverse impact on a biological amenity than untreated oil at the same concentration.

Undispersed oil in nearshore areas and on shorelines can smother organisms and plants and cause extensive physical and aesthetic impacts. Undispersed oil is difficult and expensive to clean up because it typically adheres to shoreline surfaces.

Use

There are three basic types of modern dispersants: water-base, solvent-base, and concentrate. They differ mainly in the nature of their carrier

Table B-1. DISPERSANT APPLICATION EQUIPMENT AND TECHNIQUES

| Type of Equipment | Application Technique | Dispersant Type |
|---|---|---|
| Hand-operated garden sprayer | Manual application from vessel or dock | Premixed solvent base, water base or concentrate |
| Portable pump and hand-carried spray nozzle | Manual application from vessel or dock | Premixed solvent base or concentrate |
| Spray boom and low pressure pump | Direct application from vessel at sea; agitation with breaker boards | Premixed solvent base |
| Spray boom, high pressure pump and eductor or metering pump | Direct application from vessel at sea: agitation with breaker boards, water streams or propwash optional | Concentrate or water base diluted onboard with sea water |
| Fire monitor/hose, high pressure pump, and eductor or metering pump | Direct application from vessel at sea or from dock: agitation optional | Concentrate or water base diluted onboard or dockside with sea water |
| Helicopter with spray booms | Aerial application: agitation from wind and waves | Undiluted concentrates |
| Light aircraft with crop dusting apparatus | Aerial application: agitation from wind and waves | Undiluted concentrates |
| Heavy aircraft with spray booms | Aerial application: agitation from wind and waves | Undiluted concentrates |

medium and the ease with which dispersions are formed. Dispersion using water-base formulations typically requires more time and energy. Because they use water as a solvent, these products can be diluted on-site with seawater, thus lending themselves to vessel application. Solvent-base formulations tend to disperse more easily, but are generally more toxic and require higher dosage rates. They are ineffectual when diluted with water. Concentrates contain high percentages of surface active agents. Depending on the product, they may be used neat, diluted with seawater, and/or diluted with hydrocarbon solvents. The "self-mixing" type of concentrate requires extremely low levels of mixing energy. By virtue of their versatility, dispersant concentrates lend themselves to most methods of application.

Dispersant use is greatly affected by the type of oil. Rapidly spreading oils are more easily dispersed than heavy or slowly spreading oils. Solvent base dispersants were formulated primarily for use on heavy or paraffinic oils as they are harder to break down. Chemical dispersion of highly weathered oils or water-in-oil emulsions is typically very difficult, if not impossible.

Application Techniques and Equipment

There are three basic techniques used to apply dispersants to floating oil; each has its own variety of application equipment. The three application techniques are: manual, vessel and aerial. The actual equipment and technique used depends on the type of dispersant to be applied, and the size and location of the spill. Table B-1 lists the type of equipment needed for the various dispersing agents and application techniques.

Manual Application. Manual application is typically limited to use in very small spills or confined areas. The equipment consists of three-to-five-gallon garden sprayers, usually the backpack type, or portable pumps with hand-carried nozzle sprayers. Equipment should be fitted with nozzles producing a coarse spray for applying dispersants. Manual application is usually done from the shoreline, a dock or pier, and can also be done from small boats.

Vessel Application. Basically, there are three types of vessel mounted application systems: bow spray, Warren Spring Laboratory (WSL) - type, and high-pressure jet spray. The bow spray and WSL systems both use booms fitted with spray nozzles to apply the dispersants. The nozzles produce coarse flat sprays which overlap slightly at the water surface. The bow spray system has the booms mounted near the vessel bow. With the WSL system, booms are positioned slightly aft of midship. The WSL system also incorporates breaker boards towed behind the spray booms to provide external mixing energy. Bow wakes and propellor wash from several small boats and high-pressure water streams from fire fighting equipment can also be used to supply energy.

The third system uses fire fighting monitors or hand-held nozzles to apply dispersants. The high-pressure streams are directed in an arc up over the slick or played back and forth across the oil. In most cases the vessel's own salt-water fire fighting system is used.

These systems are used primarily to apply water-base or concentrated dispersants in heavily diluted solutions. The systems operate by drawing water from the sea and supplying it to the booms or monitors at high pressures and volumes (100 psi and 100-250 gpm respectively). The dispersant is introduced into the mainstream of water using an eductor or metering pump at a rate which produces the desired concentration.

Also available is a WSL low pressure volume system for applying hydrocarbon-base dispersants. In this case the agent is supplied directly to the booms with no dilution.

Aerial Application. Three types of aircraft have been used in aerial application of dispersants: helicopters, light, and heavy fixed-wing aircraft. Suitable aircraft typically come fitted with agricultural or fire fighting spray systems which require only minor modification for dispersant use. The spray systems are usually supplied with misting or atomizing nozzles which must be replaced with ones producing a coarse spray.

Two types of spray systems are available for use with helicopters. One is the on-board type which has the spray booms, tanks, and motor fitted directly to the helicopter. The other system has a single unit consisting of the booms, tank and pump, which is slung underneath the helicopter. The advantage of this system is that it can be hooked up in a matter of minutes to almost any available helicopter.

## Dosage

Dosage required for effective dispersion will vary with each spill situation. Most manufacturers supply or can provide dosage recommendations with their products. Subject to regulatory approval, these recommendations can be used as a starting point for dosage determination. The optimum dosage (number of gallons of dispersant applied per acre of slick), is primarily governed by the slick thickness. Generally, the amount of dispersant required is directly proportional to the thickness, and therefore the volume of oil per acre. Under normal conditions the recommended dosage for most dispersants is 5 to 10 gallons per acre for an average slick thickness of 0.5 to 2.0 mm. By trial application, dosage should be adjusted to achieve the desired result at the minimum application rate.

## APPENDIX E

### Filter Fence/Sorbent Barrier

Permeable barriers constructed onsite and made of wire screen or mesh and sorbents can be used to contain or exclude oil from interior areas such as marsh, channels and mosquito ditches. Permeable barriers offer the advantages of noninterference with flow, conformance with bottom configuration, and response to tidal variation. Because of flow reverses in tidal areas, double barriers are required. A diagram of a typical permeable barrier is shown in Figure A-1. While a variety of screen and mesh fencing is available, heavier materials are recommended. When subjected to high currents and debris, lighter material such as chicken wire will probably fail.

Single-sided permeable barriers may be constructed in small streams or channels having continual water flow in one direction. In this case a single line of posts is driven into the stream bottom with the screen fastened to the upstream side. Sorbent is also placed on the upstream side of the barrier only, relying on the current to hold it in place.

The screen height in both cases must be sufficient to prevent sorbent from going over the top at high tide and under the bottom at low tide. The screen mesh size must be compatible with the type and size of the sorbent used.

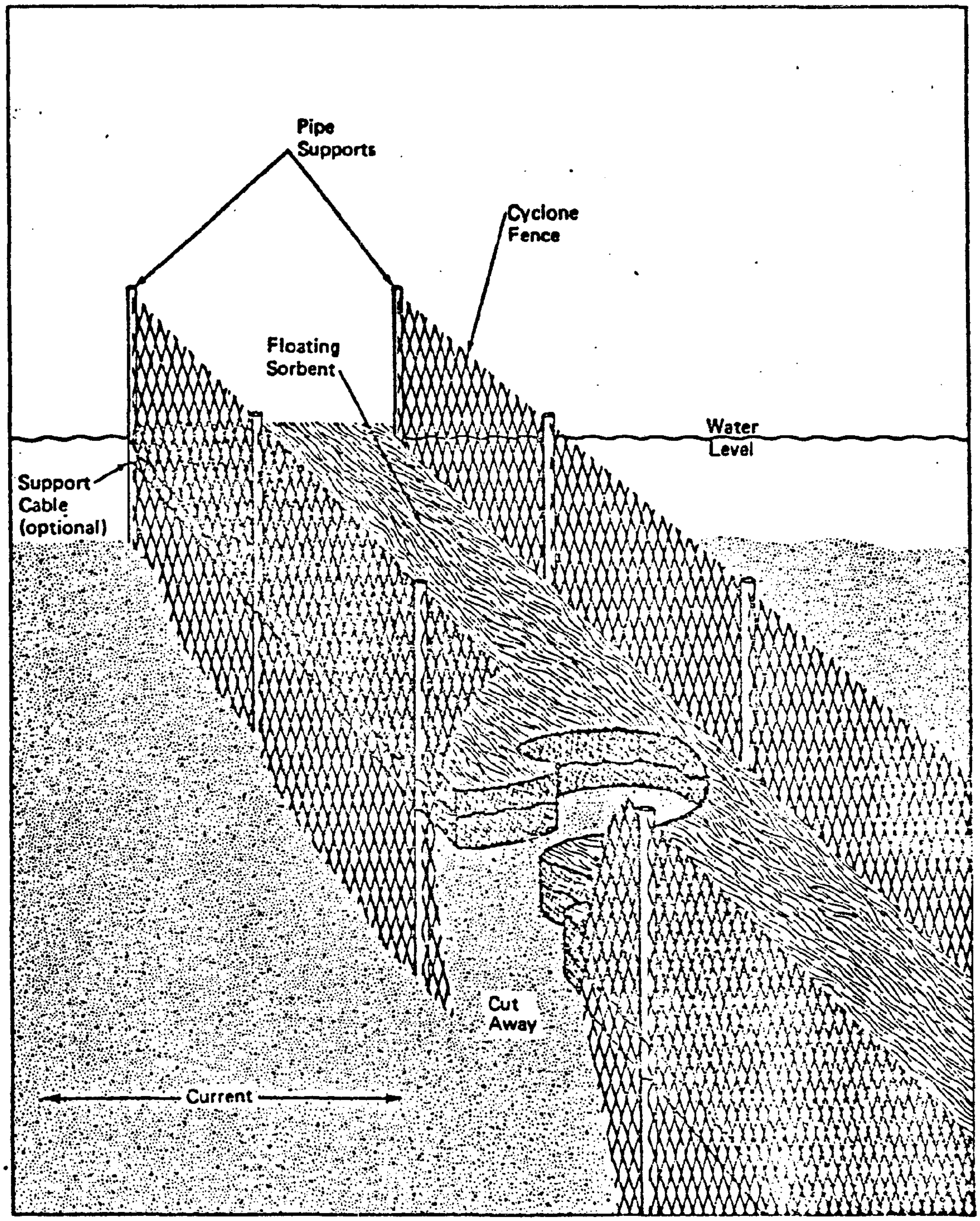


Figure 1. TYPICAL PERMEABLE BARRIER